EDP industry report and market review

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2	11/9/73	Mincomputer market
3	11/20/73	IBM "wins" second round against Telex
4	12/6/73	Telecommunications power struggle continues
5	12/20/73	IBM introduces 3740 data entry system
6	12/31/73	Preliminary 1973 shipments and 1974 forecast
7	1/16/74	IBM's System Q
8	1/30/74	Telex motion denied; Minicomputer applications
9	2/13/74	Terminal market
10	2/27/74	User spending for 1973 and 1974 forecast
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12	3/27/74	AT & T files tariffs for DDS
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20	7/23/74	Control Data, organization and strategy
21	8/2/74	Hart Subcommittee looks at computer industry
22	8/15/74	IBM user migration, 360 to 370
23	8/28/74	Microcomputers; Outlook for independent memory
24	9/11/74	Inforex System 5000; First Data's 'Clockwork'

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" OCTOBER 31,1973 • VOL.9,NO.1 P.J.McGOVERN,EDITOR

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JUDGE HOLDS FIRM ON IBM AS MONOPOLIST . . . TELEX AS THIEF BUT PROMISES NEW DAMAGE CALCULATIONS AND MODIFIED INJUNCTIVE RELIEF

When Judge A. Sherman Christensen earlier this month stated that his "computation of antitrust damages against International Business Machines Corporation involves substantial error," most court watchers expected some rather dramatic developments as the post-trial hearings convened Oct. 16 in Tulsa. More than 100 people -- including a contingent of top IBM brass headed by Chairman Cary -- crowded into the courtroom. Turns out their only accomplishment was a tedious tutorial in the intracacies of antitrust procedure.

After a week of courtroom maneuvers during which it appeared, at times, that the 31-day IBM/Telex trial might have been to no avail, the Judge managed to tie things back together . . . almost.

Actually, the two basic findings -- that IBM had monopolized the market for plug-compatible peripherals and that Telex had stolen trade secrets from IBM -- remained intact and unchallenged during the hearing. Either or both of these will be key subjects when the case finally goes to the Tenth Circuit Court (in Denver) for appeal. It was the question of damages -- and possible changes in injunctive relief (EDP/IR Sept.24,1973) -- around which attention was focused in Tulsa. The Judge described his "error" as follows:

> I came to the conclusion unavoidably that the counterclaim damages, at least in substantial part, as representing the unjust enrichment component, must be offset against any antitrust damages, and that conclusion opened up a further problem, of whether, by way of quantification in the computation of antitrust damages, there must be applied a factor representing a fair approximation of the competitive advantage secured by Telex and reflected in damage projections to the extent utilized as an off-set to any damages awarded.

After thus stating it was "set-off" that had him concerned, the Judge considered holding a new trial on damages . . . then decided he had enough evidence so he refused to hear any new testimony or friends of the court. He talked to the lawyers in chambers . . . listened to arguments about changing injunctive relief . . . told both sides to submit damage recalculations by October 29 . . . and promised an appealable decision by mid-November.

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In asking for these additional filings, Judge Christensen essentially said to each side: "I know you think you are right . . . and your 'all-or-nothing' position is duly noted for the record . . . but I have decided to award Telex some damages and to set up certain rules under which IBM should operate. I have also come to the conclusion that Telex stole trade secrets from IBM and that the effect of this should perhaps be considered in calculating how much damage Telex suffered. So . . . help me think this out and in return I will give you a new decision that can be appealed. We want a good package for the higher courts."

This approach produced a lot of rhetoric, but doesn't seem to have been too helpful. But, who knows? A new batch of law and interpretation of the evidence is now available for the Judge to ponder.

Facts about theft . . . assumptions about damages

IBM, in its memorandum to Judge Christensen, continued to follow the hard line it created, during the hearings, where an uninformed observer might well have thought that IBM was the victor, not the loser in a gigantic antitrust decision. "We rely on the unquestioned principle that a wrongdoer may not recover damages based upon its plans to steal," IBM argues. And it brings up the second part of Calnetics v. Volkswagen, a case "on which Telex heavily relied for its theory of market definition." In this case, the judge said: "Damages cannot be predicated upon sales or a market position obtained and enjoyed by reason of such conduct [revenue increases obtained through secret payments]."

The following two excerpts from IBM's memorandum seem adequately to sum up the line of reasoning IBM now follows, and what it requests the Judge to do:

> As the Court found, Telex's officers through the time of trial sought to dissemble concerning its massive and pervasive plan to steal. Part of that dissembling was the reliance upon the November 1970 plan as a basis for calculating damages. If there are problems in figuring out what part of that plan is the small part not involved directly in the theft, they are problems of extracting clean fruit from the poisonous tree. And those problems are Telex's problems, not ours or the Court's.
>
> IBM believes that the Court should eliminate the damage award to Telex in its entirety. If the Court believes that should not be done, we believe the only alternative left is certification under 1292(b) [allow appeal before damages are determined].

IBM had and exercised monopoly power

As was also expected, Telex in its memorandum held firm, and even suggested that damages might be increased in asking a rhetorical question designed to "illustrate the unfairness of issues raised." Two quotes put across the message:

> Should the 'competitive advantage' obtained by IBM through its monopolistic practices and violations of Section 2 of the Sherman Act be quantified and awarded to Telex in addition to its other damages?
>
> Plaintiffs respectfully submit that the Court will commit substantial legal error if it reduces Plaintiffs' antitrust damages upon the theory that Plaintiffs' damages resulting from a competitive advantage obtained from misappropriation of IBM's trade secrets is not recoverable in this action.

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ADJUSTING AWAY THE TELEX DAMAGE CLAIM

In a 70-page memorandum with six appendices filed Oct. 29, IBM argues that the Court "should eliminate the damage award to Telex in its entirety" (see text). At the Tulsa hearing, however, it presented six ways Telex's "base" damage claim of $361.3 million could be reduced . . . and three types of damages that should be eliminated.

	Reduction ($M)
1. Since most Telex damages are for lost future profits, reduce them to present value at 10%	$ 85
2. Use a Telex business plan from Feb. 1971 rather than the "11/70 Forecast" used by the court.	$ 88
3. Reduce product rental life used in Telex damage forecasts from 54-to-72 months to a "more realistic" 48 months. . .	$ 96
4. Use 12% as the profit discount caused by the fixed-term plan rather than the 25+% used by Telex in its calculations . .	$112
5. Reduce Telex profit on future sales from the 50%-to-87% level (based on IBM incremental profit) to a "realistic" 20%. .	$267
6. Increase the Telex incremental costs credited against future sales from 14% to 45%.	$ 92
- - - - - - - - - - -	
7. Elimination of products stolen and planned to be stolen. . .	$304
8. Elimination of post-9/73 damages (since eliminated by injunctive relief and therefore "double penalty".	$304
9. Elimination of claimed future losses because of "obsolete" and "outmoded" products per Telex memo of 10/12/73. . . .	?

These are not additive, of course, and the use of concepts implied in one would affect how other aspects of damage are calculated.

In rebuttal, Telex pointed out that IBM's own forecasts attributed to Telex a greater potential share of market than Telex had used in its calculations.

When the decision comes, equitable relief almost certainly will be clarified, probably narrowed. Damages will be adjusted downward. But EDP/IR fully expects Telex to receive well more than the $22 million it owes IBM. As the Judge said:

> I thought that Telex's potential, without resorting to the exaggeration frequently quoted of 'going to the moon,' was great and substantial, and it did suffer serious impact and detriment through violation of the anti-trust laws, and I continue to entertain that conviction.
>
> The key to this case always, I suppose, has been market definition, and I suppose that if the case is significant in the long run, it will be either that I'm right or wrong in that determination, and both sides, I know, are deeply sincere in their conviction that they arrived at.

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IBM'S POS SUPERMARKET SYSTEM AT A GLANCE

3666 CHECKOUT SCANNER. The major innovation in IBM's new grocery system, this laser scanner beams light through a window on the surface of the counter, reads prices and descriptions of items labeled with the Universal Product Code as they pass over at up to 100 inches per second. The price is $4,000, purchase only.

3663 SUPERMARKET TERMINAL. Components include a keyboard with 10 numeric and 25 function keys for manual entry of unlabeled items such as meat and produce; two-station itemized receipt printer; a cash drawer and a 22 character display panel that shows the customer all entries and totals while checkout is in progress. Model 1 has control features to handle one additional Model 2 in tandem; each Model 1 costs $5,800 and Model 2 is priced at $2,700, purchase only.

3651 MODEL 60 STORE CONTROLLER. Disk based minicomputer that links terminals to host 370 computer. Same as IBM's retail store controller except for small main memory (28K vs. 40K). Stores prices and descriptions for 22,000 items; handles credit authorization for up to 24,000 customers. The Model 60 accumulates sales data in batches for periodic transmission to the central computer via switched telephone lines. Price is $29,300 or $675 per month ETP.

3669 COMMUNICATION CONTROLLER. Coordinates communications among all components of the system. An optional second communications loop can hook terminals in a second store to the controller for back-up use if controller in the second store breaks down.

IBM puts the purchase price of a "typical" eight terminal system at about $118,000, not including the cost of the virtual storage 370 central computer. First deliveries of the system are scheduled for the third quarter of 1974.

IBM ANNOUNCES FAST CHECKOUT SYSTEM FOR THE NATION'S GROCERS

Continuing its march into what International Data Corporation calls the autotransaction industry (EDP/IR Aug.23,1973), IBM earlier this month introduced the third in what is becoming a line of "3000 series" products -- the 3660 supermarket system. It is based on an IBM laser scanner for the grocery industry Universal Product Code, a version of the controller/minicomputer developed for the retail system, two terminal/cash register devices . . . and 370 interaction (box, above).

IBM's timing for its supermarket entry really couldn't be better. The UPC, adopted last April, is very similar to the bar code design proposed by IBM; deliveries of the 3660 begin the third quarter of 1974, a time at which grocers expect 50%-to-75% of their products to have UPC codes printed on the labels. What's more, checkout accuracy alone should bring grocers rushing into UPC use.

At the register, IBM's system reads the product code, looks up the price in its memory, displays the generic name of the product and its price, prints this on the tape. At the same time, it stores records on sales by product . . . transmitting to a central 370 from time to time. From this information, grocery chains know what products are moving, and can plan store shipments more accurately.

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UNIVAC PLUGS A PRODUCT GAP; SAYS THERE'S MORE TO COME

Univac struck an aggressive note when it unveiled its new medium scale computer -- the 90/60 -- last week, playing up its new offering as the "prime competitor" to the 370/135 and declaring itself ready for an attack on "a major share" of IBM's 360/30 and 360/40 base.

Brave words from the number three mainframer -- but not very convincing to an industry that's seen IBM's marketing momentum push aside many another assault. The real interest in the 90/60 -- and its promised successors in the Series 90 family -- is likely to come from inside Univac's own customer base, where worries about Univac's spotty upgrade path have caused loyalty problems in the past. The new machine is only the first step in a campaign designed to lock both Univac and RCA users onto a comfortable upward track -- and offer entry level users a small machine competitive with System 3. The need for a new small scale computer in the Univac line is becoming acutely clear as more and more 9200 and 9300 customers defect to other mainframers.

Thus it was no surprise to hear that a small system in the 90 series will be announced in about six months, with more new models ranging from very small to moderately large scheduled to follow at six month intervals over the next year and a half. Meanwhile the 9700 -- a slow seller in the U.S. since it was introduced a year ago -- has been fitted with semiconductor memory and renamed 90/70, taking a place just above the 90/60 in the new series.

The 90/60 introduces no big technological leaps -- but reportedly offers 1.6 times the processing power of the 370/135 within about the same price and memory range. Microprogramming features and a fast 150-nanosecond cycle time should give series 90 machines an attractive edge over competitive equipment and push a little further along the evolutionary trail toward better price/performance. Univac estimates typical system prices at between $12,000 and $24,500 per month under a five year lease plan. Memories range from 131K to 512K bytes.

Series 90 software offerings -- which Univac will continue to bundle with the systems price -- emphasize the "one big happy family" theme Univac wants to put across. The 90/60 is field upgradable to 90/70 and both machines will use Univac's long-awaited OS/7, an operating system claimed to be "functionally richer" than IBM's virtual storage and more efficient for all but the biggest jobs. Univac says OS/7 is compatible with 360/DOS as well as Univac series 9000 software. Emulators for RCA /70 and 301 models should ease the transition for RCA customers who want to stay in the Univac fold -- an important consideration in the design of the new family.

In a way, the 90/60 is interesting for what it lacks. Plated wire memory, for instance. Univac had high hopes for plated wire because of its mass production possibilities and offered it on the original 9700. Now Univac has about-faced and joined the march to semiconductors -- foreseeing that MOS memory will very quickly become cheaper than any other technology as chip densities increase.

Virtual storage has yet to appear in the Univac line-up and company spokesmen avoid giving the concept any across-the-board endorsement. But a team of programmers taken over from RCA -- one of the first VS enthusiasts -- is working on the problem and Univac is talking about introducing the "first workable" virtual storage system soon.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF OCTOBER 1, 1973

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	B-200 Series	$ 5,600	11/61	123	80	203	X
	B-300 Series	$ 5,200	7/65	400	63	463	X
	B-500	$ 6,000	11/68	480	450	930	X
	B-705	$ 1,200	3/73	50	25	75	NA
	B-711	$ 1,400	3/73	37	12	49	NA
	B-1712	$ 1,950	8/72	85	40	125	115
	B-1714	$ 2,200	8/72	115	45	160	145
	B-1726	$ 5,300	2/73	85	35	120	120
	B-1728	$ 7,700	8/73	7	3	10	90
	B-2500	$ 8,200	2/67	268	121	389	X
	B-2700	$ 8,700	8/72	50	22	72	65
	B-3500	$ 14,700	5/67	580	365	945	X
	B-3700	$ 20,000	11/72	36	11	47	56
	B-45/4700	$ 27,000	10/71	92	35	127	65
	B-5500	$ 35,000	3/63	90	32	122	X
	B-5700	$ 29,500	12/70	22	7	29	11
	B-65/6700	$ 50,000	11/69	52	46	98	13
	B-7700	$120,000	8/73	1	0	1	3
	Subtotals			2,573	1,392	3,965	683
Control Data Corp.	G-20	$ 19,600	4/61	3	7	10	X
	1604/A/B	$ 42,000	1/60	19	5	24	X
	31/3150	$ 9,000	12/64	90	50	140	X
	3170	$ 17,500	12/70	14	9	23	X
	3200	$ 14,700	5/64	53	45	98	X
	3300	$ 28,800	9/65	108	93	201	X
	3400	$ 23,700	11/64	5	10	15	X
	3500	$ 26,000	1/69	10	15	25	X
	3600	$ 48,000	6/63	20	15	35	X
	3800	$ 53,000	12/65	23	4	27	X
	6200	$ 39,000	11/70	2	6	8	X
	Cyber-72	$ 32,900	10/71	10	19	29	12
	6400	$ 54,000	5/66	60	48	108	X
	Cyber-73	$ 47,000	3/72	8	15	23	13
	6500	$ 68,000	12/67	18	12	30	X
	6600	$115,000	8/64	60	33	93	X
	Cyber-74	$105,000	3/72	2	5	7	4
	6700	$125,000	7/70	2	1	3	X
	7600	$165,000	1/69	11	6	17	X
	Cyber-76	$165,000	3/72	2	2	4	2
	Star-100	$250,000	8/73	1	0	1	2
	Subtotals			521	400	921	33
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	16	9	25	X
	1040/1050	$ 13,300	10/67	168	69	237	13
	1055	$ 22,000	12/71	20	7	27	11
	1070/1077	$ 30,000	6/72	10	2	12	7
	Subtotals			214	87	301	31
Honeywell	Gamma 10	$ 2,500	7/64	0	925	925	X
	G-5X Series	$ 1,550	1/66	335	2,650	2,985	100
	G-100 Series	$ 4,000	4/66	335	1,465	1,800	X
	G-200 Series	$ 13,700	4/61	217	68	285	X
	G-405/410	$ 9,000	2/68	16	7	23	X
	G-415/420	$ 14,000	5/64	153	193	346	X
	G-425/430	$ 17,000	6/64	49	103	152	X
	G-435/440	$ 22,000	9/65	79	49	128	X
	G-615	$ 55,000	6/69	8	22	30	X
	G-625	$ 65,000	4/65	2	3	5	X
	G-635	$ 80,000	5/65	54	15	69	X
	G-645	$120,000	7/66	3	1	4	X
	G-6025	$ 21,800	11/73	-	-	-	50
	G-6030/40	$ 33,000	6/71	52	66	118	70
	G-6050/60	$ 46,500	7/71	38	29	67	50
	G-6070/80	$ 61,500	7/71	12	6	18	16
	G-6180	$100,000	2/74	-	-	-	7
	G-Subtotal			1,353	5,602	6,955	293
	H-105	$ 2,500	11/71	510	150	660	180
	H-110	$ 2,600	9/68	188	282	470	X
	H-115	$ 5,300	3/70	1,000	440	1,440	60
	H-120	$ 4,600	1/66	405	197	602	X
	H-125	$ 7,900	12/67	98	294	392	X
	H-200	$ 6,400	3/64	490	240	730	X
	H-2020	$ 2,350	2/73	135	25	160	110
	H-2030	$ 5,050	1/73	23	9	32	25
	H-2040	$ 9,000	4/72	200	60	260	100
	H-1015	$ 12,500	4/71	107	67	174	30
	H-2050	$ 14,100	4/72	109	39	148	70
	H-12/1250	$ 12,000	2/66	323	157	480	X
	H-2015	$ 17,800	2/71	115	45	160	X
	H-2060	$ 18,500	4/72	60	10	70	37
	H-2200	$ 19,600	1/66	122	54	176	X
	H-2070	$ 23,000	5/72	33	5	38	21
	H-3200	$ 26,900	2/70	68	40	108	3
	H-4200	$ 31,000	9/68	30	5	35	X
	H-2088	$ 44,000	4/72	6	1	7	4
	H-8200	$ 73,000	2/69	22	5	27	X
	H-4/1400	$ 13,200	12/61	33	23	56	X
	H-800	$ 28,500	12/60	38	12	50	X
	H-1800	$ 46,000	7/64	7	4	11	X
	H-Subtotals			4,122	2,164	6,286	640
	HIS-Subtotal			5,475	7,766	13,241	933

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AS OF OCTOBER 1, 1973

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IBM	System 3/6	$ 1,530	12/70	2,250	1,630	3,880	1,000
	System 3/10	$ 2,200	1/70	13,300	6,250	19,550	2,600
	System 3/15	$ 4,550	2/74	-	-	-	NA
	360/20	$ 3,600	12/65	3,935	4,850	8,785	X
	360/22	$ 5,800	7/71	1,325	330	1,655	200
	370/115	$ 6,650	2/74	-	-	-	1,500
	360/25	$ 7,500	10/68	910	1,270	2,180	X
	370/125	$ 9,800	6/73	360	120	480	2,700
	360/30	$ 11,000	6/65	3,240	2,495	5,735	X
	370/135	$ 15,900	5/72	1,920	860	2,780	1,500
	360/44	$ 14,200	7/66	66	88	154	X
	360/40	$ 19,400	6/65	1,650	1,845	3,495	X
	370/145	$ 27,200	7/71	1,610	725	2,335	800
	360/50	$ 32,100	8/65	705	575	1,280	X
	370/155	$ 52,600	2/71	1,220	550	1,770	X
	370/158	$ 59,200	5/73	60	25	85	750
	360/65	$ 68,000	11/65	500	220	720	X
	370/165	$ 89,800	6/71	201	60	261	X
	370/168	$105,000	7/73	16	4	20	250
	360/67	$112,000	6/66	39	10	49	X
	360/75	$ 94,000	1/66	33	14	47	X
	360/85	$141,000	10/69	5	5	10	X
	360/9X	$150,000	11/67	11	3	14	X
	360/195	$188,000	3/71	15	4	19	X
	370/195	$192,000	5/73	3	-	3	13
	1130	$ 2,300	2/66	2,830	2,020	4,850	
	1401	$ 3,700	9/60	1,125	1,125	2,250	X
	1401-G	$ 2,300	5/64	65	40	105	X
	1401-H	$ 1,300	6/67	50	52	102	X
	1410	$ 17,000	11/61	113	59	172	X
	1440	$ 4,700	4/63	285	310	595	X
	1460	$ 9,800	10/63	65	47	112	X
	1620	$ 2,700	9/60	343	196	539	X
	7010	$ 26,000	10/63	14	9	23	X
	7030	$160,000	5/61	4	1	5	X
	704	$ 32,000	12/55	1	1	2	X
	7040	$ 25,000	6/63	9	17	26	X
	7044	$ 36,500	6/63	9	11	20	X
	705	$ 38,000	1/56	5	3	8	X
	7070-74	$ 27,000	3/60	111	40	151	X
	7080	$ 60,000	8/61	51	1	52	X
	7090/94	$ 70,500	8/60	87	16	103	X
	Subtotal			38,541	25,881	64,422	11,313
NCR	Century-50	$ 1,950	2/71	885	70	955	180
	Century-100	$ 2,980	9/68	1,140	815	1,955	X
	Century-101	$ 2,750	10/72	275	0	275	150
	Century-200	$ 7,900	9/69	640	350	990	75
	Century-251	$ 10,000	11/73	-	-	-	50
	Century-300	$ 20,000	2/72	16	16	32	20
	304	$ 10,000	1/60	9	0	9	X
	310	$ 1,000	5/61	16	9	25	X
	315	$ 5,000	5/62	323	318	641	X
	315-RMC	$ 11,800	9/65	55	47	102	X
	390	$ 800	5/61	247	143	390	X
	500	$ 1,100	10/65	792	1,568	2,360	X
	Subtotal			4,398	3,336	7,734	475
Philco	1000	$ 7,000	6/63	15	1	16	X
	210/211	$ 40,000	10/58	11	1	12	X
	212	$ 52,000	1/63	6	1	7	X
Singer	System 10	$ 2,500	10/70	820	600	1,420	340
Standard Computer Corp.	IC-4000	$ 9,000	9/68	5	0	5	X
	IC-6000	$ 16,000	5/67	3	0	3	X
	IC-7000	$ 17,000	6/69	6	0	6	X
Univac	I/II	$ 25,000	3/51	2	4	6	X
	III	$ 25,400	8/62	42	41	83	X
	SS-80/90	$ 8,000	8/58	27	27	54	X
	418-I/II	$ 13,700	6/63	79	61	140	X
	418-III	$ 19,600	7/69	46	64	110	6
	491/492	$ 27,000	12/61	13	12	25	X
	494	$ 41,400	2/66	52	38	90	X
	1004	$ 1,000	2/63	910	940	1,850	X
	1005	$ 1,630	4/66	718	170	888	X
	1050	$ 8,800	9/63	181	140	321	X
	1103/5	$ 35,000	12/50	0	3	3	X
	1106	$ 40,000	12/69	65	79	144	38
	1107	$ 57,000	10/62	8	14	22	X
	1108	$ 68,000	9/65	150	102	252	6
	1110	$ 79,000	6/72	7	20	27	20
	9200	$ 2,300	6/67	1,560	910	2,470	X
	9300	$ 4,050	9/67	875	910	1,785	30
	9400	$ 11,600	5/69	265	265	530	60
	9700	$ 21,000	8/72	20	10	30	27
	90/60	$ 16,200	1/74	-	-	-	NA
	90/70	$ 22,000	11/73	-	-	-	NA
	Larc	$135,000	5/60	1	0	1	X
	Subtotal			5,021	3,810	8,831	187
	301	$ 6,600	10/60	180	13	193	X
	501	$ 16,100	6/59	19	1	20	X
	601	$ 40,900	11/62	2	0	2	X
	3301	$ 22,700	7/64	64	0	64	X
	Spectra 70/15	$ 4,000	9/65	14	0	14	X
	Spectra 70/25	$ 7,000	9/65	1	1	2	X
	Spectra 70/35	$ 11,800	1/67	113	6	119	X
	Spectra 70/45	$ 22,600	11/65	280	22	302	X
	Spectra 70/46	$ 37,400	11/68	39	2	41	X
	Spectra 70/55	$ 34,900	11/68	6	3	9	X
	Spectra 70/60	$ 40,500	9/70	18	0	18	X
	Spectra 70/61	$ 47,200	3/71	14	0	14	X
	Spectra 1600	$ 3,600	1/69	70	0	70	6
	Spectra 70/2	$ 11,500	7/71	135	0	135	X
	Spectra 70/3	$ 18,900	10/71	10	0	10	X
	Spectra 70/6	$ 29,300	10/71	39	0	39	X
	Spectra 70/7	$ 36,300	10/71	18	0	18	X
	Subtotal			1,022	48	1,070	0
	Total			6,043	3,858	9,901	193
Xerox	Sigma-5	$ 11,500	8/67	130	35	165	X
	Sigma-6	$ 20,000	11/70	28	4	32	5
	Sigma-6E	$ 6,100					
	Sigma-7	$ 24,000	12/66	85	25	110	X
	Sigma-8	$ 19,000	9/71	7	5	12	3
	Sigma-9	$ 44,000	11/71	15	7	22	8
	530	$ 4,500	8/73	5	0	5	NA
	940	$ 24,000	4/66	60	3	63	X
	9300	$ 8,500	11/64	29	6	35	X
	Subtotal			359	85	444	16
	TOTALS			58,990	43,408	102,398	14,014

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• CONTROL DATA CORP.'S LONG-RUMORED EFFORTS to reach a trade agreement with the Soviet Union broke into the open last week with the announcement of a pact that should put CDC in first place in the Russian computer market at least for the next decade. Exactly what the agreement will entail hasn't been spelled out yet -- joint research and development teams will be the starting point -- but it looks as though CDC will be trading its experience and expertise in return for a long term interest in the U.S.S.R.'s slowly developing computer industry, potentially the largest outside the U.S.

Despite the Russian's urgent need for more and better computers -- they appear to lag 10 years behind the U.S. in manufacturing and technology -- the Soviets seem determined to buy know-how rather than finished products. They will be looking to CDC for help in manufacturing, networking and the design of large-scale computers, probably giving CDC a share of the components they produce in trade. No doubt the U.S. Department of Defense will keep a close eye on the final terms of the trade -- and could veto some disclosures -- but one unofficial estimate put the long range value of the pact to Control Data as high as $500 million.

• THIRD QUARTER BALANCE SHEETS show 1973 shaping up as a prosperous year for mainframers. IBM earned more money -- $409.9 million from revenues of $2.76 billion -- during the past quarter than during any similar period in its history. Burrough's earnings for the quarter were 30% higher than a year ago and nine month earnings of $62 million were 35% above last year's. Burroughs also reported its backlog up 34% since January. CDC's quarterly earnings on computer operations rose to $3.5 million from $2.6 million last year, though overall earnings showed a slight drop. Honeywell also predicted higher quarterly earnings this year.

• INDEPENDENT MEMORY MANUFACTURERS ARE MOVING rapidly into what one describes as "the biggest potential memory market in history" -- add-on, replacement and extension memories for the 370/145. Cambridge Memories Inc. installed the first of its 145 STOR semiconductor boxes this month -- and estimates the total market at over $2 billion during the model's lifespan. Cambridge's bipolar chips are "identical" to IBM's and its memories can be extended to two megabytes -- four times the IBM limit on Model 1 and twice the capacity offered on Model 2. The company says its boxes are transparent to the 145 CPU, incorporate automatic error correction and storage protection and cost from 10% to 40% less than IBM memories.

Itel, the biggest independent memory distributor with about 50% of the market and 115 megabytes already installed on larger 370s, began delivering 145 add-ons in July. Itel offers up to a megabyte -- the same as IBM -- but says most of its initial customers expanded from 128K to 256K. IBM has inspected and agreed to maintain all five of the CPUs equipped so far with Itel add-ons, built by Advanced Memory Systems. Price is $104,370 for 256K.

Memory Technology Inc. installed its first 145 add-on in September for a Boston area computer services firm. Also offering a megabyte maximum, MTI is charging $100,000 per 256K. With more than 2,200 145s already installed worldwide, independents see the add-on market growing by leaps and bounds -- and hope to see court-enforced separate pricing of IBM resident memory give them a foothold inside the CPU as well.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" NOVEMBER 9,1973 • VOL.9,NO.2 P.J.McGOVERN,EDITOR

Minis: Growing . . . growing! -- page 4

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MINICOMPUTER SHIPMENTS, BY NUMBER, TO JUMP 50% THIS YEAR; OEM PRICES PLUNGE IN TWO-TIER MARKETPLACE AS END-USERS BUY BIGGER SYSTEMS

With the announcement of its new "Supermini," Raytheon Data Systems this week underscored more than one trend worth noting in the dizzying world of minicomputers . . . where new variations on original themes almost hide the basic two-part harmony: The small get smaller as the big stay big and nudge into applications the general-purpose computers once had to themselves. Raytheon, for example, in announcing its new RDS 500 described the almost routine improvements in price/performance . . . then said the new mini will be available on a rental basis. This is a new twist in the mini game, yet another sign the market is coming of age.

With its "muscular" new machine, Raytheon joins the ranks of mini manufacturers who are competing more and more directly with the big mainframers in more and more applications. The RDS 500 when delivered next month will provide up to 65K 16-bit words of directly addressable main memory; further, Raytheon has hopes of boosting that figure to 512K soon with a hard-wired memory manager.

In the same announcement, Raytheon unveiled a more new exotic new product -- a mini array processor called "Apollo." It's no Star, but it shares the 500's memory and can, for $57,000, add two arrays of more than 16,000 numbers each into a third array . . . from a single instruction, and some 20 times faster than the CPU could do the job under standard program control.

Developments such as these are impressive, but nothing unusual in miniland these days. The boom in minicomputers is just getting off the ground and seems to be taking the rest of the world along for the ride as minis find their way into just about every arena of human activity. Despite its astronomical growth since the end of the 1971 recession, the minicomputer market is only beginning to show its real potential.

Worldwide shipments of minicomputers will jump almost 50% this year, according to a recent major study by International Data Corp., publisher of EDP Industry Report; value of these shipments should reach $835 million. And by 1977, minis should represent a $2.5 billion business. Sound high? Maybe. But continual improvements in price/performance -- and burgeoning of new applications -- make the figures reasonable, short of major economic disaster. Some promising fields:

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- Business and banking, where mini-based point-of-sale and accounting systems are just beginning to tap the potential of autotransaction.

- Support of data entry systems and telecommunications networks, two fast-growing sectors where minis act like traffic cops.

- Automated manufacturing, where minis are closing the loop in systems that handle complete operations with linked processors.

- Customized packages that give sophisticated users clusters of inexpensive minis for on-line jobs that once required large machines.

In the numbers race, minicomputers are being shipped at 2,800 per month (see page 4) and the total number installed will exceed the population of general purpose computers before yearend. Within five years, IDC expects 10,000 minis per month to be shipped. But the meaning of such totals is somewhat questionable in a world where minis by the gross today are less than $1,000 while full-scale systmes can cost well over $100,000. And this divergence will continue.

Who buys minis?

The marketplace for minis is diffused and fragmented, harder to define than that for general-purpose computers. Most mini manufacturers sell their products as tools, letting the customer decide how to use them. Most minis -- whether used standing alone or incorporated into larger systems -- are dedicated to a single function; specialized applications abound.

Thus the mini market -- already oriented toward OEM suppliers -- will see an even greater proportion of its products going to OEM buyers. Why? Mini makers simply lack the expertise and capital necessary to crank out turnkey systems for a myriad of special applications. OEM suppliers, on the other hand, have specialized knowhow to funnel minis and mini-based systems to appropriate buyers.

Currently, 58% of minicomputers -- and 96% of miniperipherals -- produced in the U.S. go to OEM suppliers; these customers, however, represent less than half the dollar volume because they receive huge discounts. IDC expects this gap to widen still further over the next five years, with OEM buyers eventually accounting for two-thirds of mini shipments, but a mere third of the dollars.

End user sales will grow, too, but somewhat less rapidly. Minis are becoming a lot easier to use, a fact that attracts many end users even more than declining prices. The once-tedious task of programming a mini in machine language has been streamlined by larger memories that allow the use of higher level languages such as Fortran and Basic. Microdata, in fact, has just announced a new small business system programmable in simple English sentences.

Another force behind the growth of the end-user market is the steadily widening circle of minicomputer expertise in the engineering and business professions. Often, minis can take computing applications out of the DP manager's domain and let everybody into the act. This has led, among leading-edge users, to a vice president/minicomputers function. A recent IDC survey showed:

- Firms already using minicomputers indicated they plan to add new machines at the rate of 25% to 30% a year through 1975. The largest companies often expected to double or triple their usage.

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WHAT IS A MINICOMPUTER?

Month by month -- so rapidly is the market changing -- it gets harder to nail down the term "minicomputer." Each mail is likely to bring a fresh press announcement (from some known or brand new corner of miniland) that stretches the latest definition to some new limit. Prices both plummet and climb; memories expand; applications multiply; systems packages reach new levels of sophistication. While analysts' heads spin, minimakers coin money and introduce new models two and three at a time.

Several months ago -- in preparing a major market study -- International Data Corp. defined four general criteria to distinguish minicomputers from microprocessors, small business systems, and full scale computers:

- The processor is general purpose by design and sold by the maker as a minicomputer, not as a terminal or other computer-based product.
- Base price for the CPU with 4K words of memory is generally $3,500 to $25,000, and falling steadily.
- Word size is typically 24 bits or less.
- Memory is typically expandable from 4K to 32K words.

Within these ranges, price is the most rigid limiting standard at the upper end of the scale; the minimum 4K memory size was imposed at the bottom to eliminate microprocessors. In light of this, the above criteria still define the boundaries of miniland pretty well. But important exceptions have cropped up since the rules were made -- most notably, Computer Automation's Naked Mini LSI for under $1,000 -- and examples will continue to multiply.

- Steadily falling prices have opened entirely new possibilities for exploiting minis in automation and industrial process control.
- Users are growing more sophisticated and more receptive to the idea that minis can be helpful in running small businesses.

The scramble for business

The mini market currently supports at least 50 viable suppliers. DEC, with about 30% of 1972 shipments, has a slowly declining share; the original mini maker has been unable to establish an IBM-like hegemony in the market it created. Hewlett Packard, Data General, and Varian share another 25% of the dollars pie. The other two major suppliers, IBM and Honeywell with about 11% of 1972 shipments each, fall into a category of their own. Their mini products are designed primarily to help sell mainframes. The HIS mini identity is disappearing.

And despite new stand-alone capabilities offered on its System/7, IBM hasn't really taken the plunge. But, in unguarded moments, IBMers refer to the new POS store controllers as minis . . . and rumors of a mini-style "System/2" keep echoing through the marketplace. A true IBM minicomputer could change the shape of the industry if it ever appeared. Meanwhile, in the market's topsy-turvy growth, just about any technically competent and financially viable contestant has room to carve out a niche for itself. But the marketplace is changing.

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

Data on the following three pages about Dedicated Application (Group B) computers is based on the best information available to the International Data Corporation, and much of it has been verified by the manufacturers. Comments or corrections are welcome, however, and should be directed to the attention of EDP Industry Report's census editor, Walter E. Misdom.

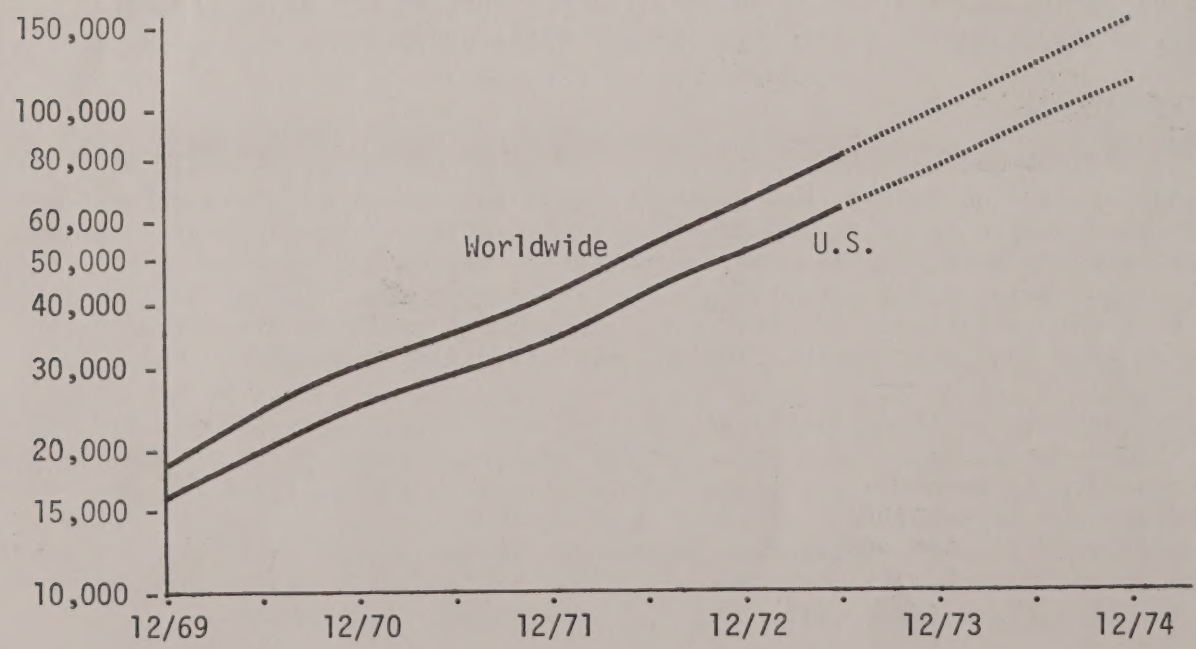
Group B computers, as defined by IDC, include those commonly called minicomputers and certain larger systems usually designed or used for one application such as process control or data acquisition. Group B computers are word oriented (most commonly 8, 12, or 16 bits/word), usually purchased, and predominately programmed in assembly language or Fortran. They are categorized:

Price Class 1 -- less than $25,000 average system price;
Price Class 2 -- $25,001 to $50,000 average system price;
Price Class 3 -- $50,001 to $100,000 average system price;
Price Class 4 -- more than $100,000 average system price.

Since EDP/IR first began publishing a Group B Census in 1969, the number of these devices has quadrupled -- and this growth shows no signs of slowing. The graph below, plotted so that a straight line indicates logarithmic acceleration, is based on data published in EDP/IR at six month intervals since early 1970. Latest studies by IDC (broken lines) indicate that this upward sweep will continue at least through 1974.

Average values for Group B computers will decline slightly as vast numbers of inexpensive minicomputers are shipped for inclusion in other equipment (see story, page 1). But this decrease will not be nearly so great as might be imagined. From the $20K level during 1972 and 1973, the average value of minicomputer shipped will drop only to the $18K level by 1975. Thus, the size of the Group B market should continue to grow rapidly.

U.S. AND WORLDWIDE INSTALLATIONS OF GROUP B COMPUTERS, U.S.-BASED MANUFACTURERS
(Estimated Number at Dates Shown; Copyright 1973 by International Data Corp.)



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AS OF JULY 1, 1973

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	CLASS	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Adage	AGT-10 Series			4		165	4/68	32	3	35	X
	AGT-100 Series			4		165	1/72	12	7	19	1
Apeco (Cascade)	80/20	*	8	2	28	35	1/70	]			
	80/30	*	8	2	31	40	1/70	]			
	80/40	*	16	3	46	57	1/70	] 215	10	225	NA
Autonetics	Recomp-II		40	4	95	127	11/58	30	5	35	X
	Recomp-III		40	3	65	94	6/61	7	2	9	X
Bailey Meter	750		25	4		110	6/60	37	15	52	X
	755		25	4	80	330	11/61	7	2	9	X
	756		25	4	90	150	2/65	15	12	27	X
	855/15		16	4	24	135	12/72	2	0	2	3
	855/25		25	4	100	400	4/68	16	0	16	X
	855/50			4		400	3/72	12	0	12	NA
Bendix	BDX-6200		20	2	25		5/70	40 +	0	40 +	NA
	BDX-9000		16	1	6		/71	8 +	0	8 +	NA
Bunker Ramo	130		15	3		90	10/61	160	27	187	X
	133		15	4		108	5/64	79	9	88	X
	230		15	4		134	8/63	15	2	17	X
	300		29	4		275	3/59	18	5	23	X
	330		29	4		275	12/60	19	7	26	X
	340		29	4		375	12/63	19	3	22	X
	1018		18	1		23	12/71	NA	NA	NA	NA
Cincinnati Milacron	CIP-2X00	a	8	1	4	12	7/69	225 +	0	225 +	NA
Clary Datacomp	404	*	16	1	6	25	1/70	100 +	20 +	120 +	NA
Collins Radio	8311			1	15	17	1/68	NA	NA	NA	NA
	8400			4		950	11/62	25	5	30	X
	8500		32	4	200	1000	1/67	53	16	69	X
Compiler Systems Inc	CSI-16		16	1	11	20	11/70	80 +	0	80 +	NA
	CSI-24		24	2	15	30	12/70	30 +	0	30 +	NA
Computer Automation Inc.	108/208/808		8	1	5	11	4/68	280	30	310	X
	116		16	1	8	16	8/70	50 +	0	50 +	NA
	216		16	1	8	20	7/69	300	30	330 +	NA
	816		16	1	10	15	12/68	40	5	45	X
	Alpha-8		8	1	3	4	5/72	]			
	Alpha-16		16	1	4	9	10/71	] 755	95	850	NA
	Naked Mini-8		8	1	2	3	5/72	]			
	Naked Mini-16		16	1	3	7	10/71	] 380	45	425	NA
	Other							585	45	630	NA
	Total							2,390	250	2,640	NA
Computer Development	CD-2000		8	1	7	10	8/70	NA	0	NA	NA
Computer Logic Systems	CLS-18		18	1	9	14	3/71	NA	0	NA	NA
Computer Signal Processors	CSP-30		16	4	85	120	6/70	10 +	0	10 +	NA
Comtec	CT/90		16	3	50		1/72	NA	0	NA	NA
Comten Inc.	10			1		17	7/69	35	0	35 +	NA
	20		16+2	3		80	3/71	75	0	75 +	NA
	40		32+4	4	125	240	8/69	22	0	22 +	NA
	60		32+4	4	150	285	9/69	18	0	18 +	NA
Consultronics	600 Series		24	3	31	80	10/65	230	0	230	X
(Scientific Control Corp.)	4700		16	3	15	72	4/69	18	0	18	X
	DCT-132		8	2	28	36	5/69	75	65	140	X
Control Data Corp.	160		12	4	60	112	5/60	49	11	60	X
	160-A		12	4	90	225	7/61	200	65	265	X
	160-G		13	4		535	3/64	34	1	35	X
	924/A		24	4		430	8/61	26	1	27	X
	1700		16+2	4	37	160	3/66	290	180	470	X
	1700-SC		16+2	3	20	60	9/70	150	130	280	X
	System 17		16+2	2	14	39	11/73	-	-	-	X
	8090		12	3		90	5/64	116	89	205	X
	8092		8	3		67	6/64	56	14	70	X
	G-15		29	3		61	7/55	265	30	295	X
	LGP-21		32	2		42	12/62	140	25	165	X
	LGP-30		32	3	49	59	8/56	290	43	333	X
	RPC-4000		32	4	87	101	10/60	61	12	73	X
	CSC-46/136/636		15	4		280	/54	27	3	30	X
	Elbit-100		12	1	6	8	6/67	5	445	450	X
	M-1000		24	4	250	365	/68	20	0	20 +	NA
	Totals							1,729	1,049	2,778	NA
Datacraft	6024-1		24	4	51	135	5/69	22	0	22	4
	6024-3		24	3	32	90	2/70	153	37	190	4
	6024-4		24	3	20	100	8/73	-	-	-	23
	6024-5		24	2	13	50	5/72	75	2	77	33
Data General Corp.	Nova		16	1	8	11	2/69	1,500	500	2,000	115
	Nova-800		16	1	7	10	3/71	485	120	605	135
	Nova-820		16	1	6	9		170	35	205	50
	Nova-840		16	2	16	50	7/73	-	-	-	NA
	Nova-1200		16	1	5	10	12/70	2,700	300	3,000	600
	Nova-1210/1220		16	1	4	8	2/72	1,540	170	1,710	640
	Nova-1230		16	1	7	15					NA
	Supernova		16	1	9	14	4/70	215	70	285	45
	Supernova-SC		16	1	14	19	6/71	95	30	125	30
	Nova-2/4		16	1	4		/73	-	-	-	NA
	Nova-2/10		16	1	10		/73	-	-	-	NA
	Totals							6,705	1,225	7,930	1,615 +
Datamate Computer Systems	DM-16		16	2	17	26	11/69	12	0	12	X
	DM-70		16	1	9	15	12/70	25	0	25 +	NA
	DM-70/ROM		16	1	4	6	10/70	NA	0	NA	NA
	ECP-18		18	1	14	15	11/66	21	0	21	X
	2400		24+3	1	15					NA	NA
Data Technology	1600		8	1	6	22	9/68	NA	0	NA	NA
Digiac Corp.	3060			1	9	13	1/70	86	0	86 +	NA
	3080		25	1	20	25	12/64	16	0	16	X
	3080-C		25	2	26	37	10/67	8	0	8	X
Digital Computer Controls	D-112		12	1	4	10	8/70	755	140	895	]
	D-116		16	1	4	10	2/72	] 793	84	877	] 1,000
	D-216		16	1	8	16	8/71	]			]
Digital Equipment Corp.	PDP-1		18	4	120	136	11/60	37	4	41	X
	PDP-4		18	3		74	8/62	30	3	33	X
	PDP-5		12	2	30	36	9/63	62	29	91	X
	PDP-7		18	3		66	11/64	58	36	94	X
	PDP-8		12	2	18	39	5/65	930	470	1,400	X
	PDP-8/e,f,m		12	1	4	12	4/71	6,955	2,195	9,150	2,100
	PDP-8/i		12	2	13	30	4/68	2,125	1,045	3,170	X
	PDP-8/l		12	1	8	21	11/68	2,810	1,065	3,875	X
	PDP-8/s		12	1	10	20	9/66	600	350	950	X
	PDP-8/Linc		12	2	38	48	9/66	82	52	134	X
	PDP-9 & 9/L		18	2	35	50	12/66	310	165	475	X
	PDP-11-05 & 15		16	1	5	10	4/71	2,410	760	3,170	730
	PDP-11-10,20 & 40		16	2	9	28	4/70	2,460	820	3,280	400
	PDP-11-45		16	3	15	75	7/72	485	165	650	480
	PDP-12		12	2	13	45	4/69	535	190	725	70
	PDP-15		18	3	15	75	2/70	405	220	625	90
	Totals							20,294	7,569	27,863	3,870 +
Digital Scientific Corp.	Meta-4		16	3	29	100	4/70	65	0	65 +	NA
Dynamic Research	DRC-44		24	2		36	7/68	NA	0	NA	NA

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Eldorado	140/200	*	8	2	18	30	1/70	260	0	260	NA
Electronic Associates Inc.	640		16	3	27	55	6/67	110	61	171	X
	1020		16	1	20	25	2/64	100	25	125	X
	8400		32	4	200	450	6/65	21	8	29	X
	Pacer-100		16	2	15	40	7/72	40	35	75	25
Electronic Processors Inc.	EPI-118		18	1	3	14	11/70	NA	0	NA	NA
	EPI-218		18	1	4	14	1/73	NA	0	NA	NA
EMR	210		21	4	94	132	4/62	9	0	9	X
	420		42	4	324	450	6/63	3	0	3	X
	2100		21	4	65	143	12/63	8	0	8	X
Foto Mem, Inc.	Centauer-100		8	1	6	20	4/70	18	0	18 +	NA
Four Phase Systems	IV/70	*	24	2	16	60	3/71	280 +	0	280 +	NA
Foxboro	Fox-1		24	4	95	260	10/72	NA	0	NA	NA
	Fox-2		16	2	21		9/72	NA	0	NA	NA
	2/10		16	2		50	11/72	NA	0	NA	NA
	2/30		16	3		80	9/72	NA	0	NA	NA
General Automation Inc.	GA-18/30		16	2	18	50	7/69	265	35	300	NA
	SPC-12		8	1	4	16	1/68	1,540	210	1,750	NA
	SPC-16		16	1	8	25	5/70	970	130	1,100	NA
GE/PAC	30	b	8	1	7	25	5/69	140	20	160 +	NA
	312		20	4		200	3/60	27	6	33	X
	412		20	4		300	7/62	39	8	47	X
	3010	c	16	3	13	90	5/70	25	1	26	X
	3010/2	d	16	4	15	140	12/71	NA	NA	NA	NA
	4010		24	4	76	200	10/70	59	7	66	NA
	4020		24	4	79	250	2/67	200	60	260	X
	4040		24	4		120	8/64	45	20	65	X
	4050		24	4		280	12/66	23	2	25	X
	4060		24	4		340	6/65	18	4	22	X
	4070		24	4	300	1,000	NA	NA	NA	NA	NA
	4401		24	4		235	9/74	-	-	-	NA
	4402		24	4		500		-	-	-	NA
	Totals							576	128	704	NA
Genesis One	Basic Four	e *	8	2	25	37	8/71	470	0	470	NA
GRI Computer Corp.	909 Series		16	1	4	9	1/70	255	45	300 +	NA
	99/30 & 40		16	1	5	15	6/72	250	0	250	NA
GTE (Tempo Computer)	I		16	2	14	36	12/69	90	10	100 +	NA
	II		16	1	6	10	1/72	30	0	30 +	NA
Hewlett Packard Co.	2000-A	f	16	4	89	101	11/68	230	65	295	X
	2000-B	g	16	4	119	134	8/70	40	4	44	X
	2000-C		16	4	187	205	3/71	245	6	251	NA
	2000-E		17	3	50	75	7/72	55	11	66	NA
	2000-F			4	110	137	7/72	93	17	110	NA
	2005-A	h	16	3	72	85	6/69	26	6	32	X
	2007-A	i	16	1	20	20 +	9/68	33	11	44	X
	2100-A		16	1	10	16	10/68	775	205	980	X
	2100-F		16	1			/73	12	0	12	NA
	2100-S		16	1	16	25	7/73	-	-	-	NA
	2114-A		16	1	10	16	10/68	435	145	580	X
	2114-B		16	1	9	15	11/69	465	140	605	NA
	2115-A		16	2	15	26	11/67	315	75	390	X
	2116-A		16	2	22	32	11/66	265	50	315	X
	2116-B		16	2	24	40	9/68	650	170	820	X
	2116-C		16	2	20	45	11/69	340	60	400	NA
	2120-A						/72	20	0	20	
	9100-A,B							95	15	110	
	3000		16	4	100	250	11/72	15	0	15 +	NA
	Others							591	135	726	NA
	Totals							4,700	1,115	5,815	NA
Honeywell	19		19	4		140	5/61	3	0	3	X
	21		20	3		63	2/66	41	25	66	X
	24		24	4		200	5/63	82	3	85	X
	112		12	1	5	10	11/69	222	48	270	X
	116		16	3		65	4/68	172	35	207	X
	124		24	4	65	130	3/66	109	18	127	X
	224		24	4	75	380	3/65	55	8	63	X
	290		18	4		175	11/60	10	2	12	X
	316		16	2	8	45	6/69	1,380	510	1,890	NA
	324		24	4	175	250	7/68	12	0	12	X
	416		16	2	17	43	4/67	198	130	328	X
	516		16	3	24	95	10/66	865	285	1,150	X
	632		32	4	97	450	12/68	10	4	14	X
	700 Series		16	3	16	53	6/72	480	120	600 +	NA
	164X Series	j	16	4	144	440	12/69	20	8	28	X
	Totals							3,659	1,196	4,855	NA
IBM	1710/1720		6	4		225	2/62	8	12	20	X
	1800		16+2	4	47	235	2/66	580	475	1,055	X
	System/7		16	3	17	58	11/71	1,500	300	1,800	900
	Totals							2,088	787	2,875	900
Imlac	PDS-1	*	16	1	10	11	2/70	NA	0	NA	NA
Information Technology, Inc.	4900/5		8	1	3	5	10/70	NA	0	NA	NA
	4900/10		16	1	10	20	10/65	25	0	25	X
	4900/20		12/32	2	30	50	10/69	10	0	10 +	NA
Infotronics	Mini/Maxi		16	1		25	7/70	NA	0	NA	NA
Intel	MCS-4		4/8	1	1	4	6/71	NA	0	NA	NA
	MCS-8		8	1	1	4	1/72	NA	0	NA	NA
Interdata	1		8	1	4	11	12/70	245	100	345 +	NA
	2		16	1	9	11	7/68	20	0	20	X
	3		16	1	13	20	5/67	200	5	205	X
	4		16	1	17	21	8/68	300	125	425	X
	5		16	1	11	25	11/70	70	20	90	X
	15		16	2	22	35	1/69	40	24	64	X
	16/18		16				5/71	3	11	14	X
	50		16+1	1	7	19	4/72	40	10	50 +	NA
	55		16+1	2	16	40	7/72	32	8	40 +	NA
	70		16	3	7	65	9/71	420	120	540	NA
	74		16	2	4	34	3/73	50	0	50	NA
	80		16	2	15	44	11/72	40	10	50 +	NA
	85		16	3	23	60	7/73	-	-	-	NA
	7/16		16	3			2/74	-	-	-	NA
	7/32		32	10			5/74	-	-	-	NA
	Totals							1,460	433	1,893	NA
Interplex	System-1		16	2		47	9/70	NA	0	NA	NA
Keane Associates, Inc.	System/4	*		3		65	11/71	100	0	100 +	NA
Lockheed Electronics	MAC-16		16	1	11	22	2/69	315	35	350	X
	MAC-Jr.		16	1	8	16	1/71	900	140	1,040	NA
	Sue-111X		16	1	6	10	9/72	225	25	250	NA
Memorex	MRX-40	*	16	4	91	180	8/72	]	]	]	X
	MRX-50	*	16	4	104	250	8/72	] 20	] 30	] 50	X
Microdata Corp.	400		8	1	3	4	1/70	132	0	132 +	NA
	800		8	1	5	8	1/69	525	125	650	NA
	810		8	1	6	10	5/69	355	110	465	NA
	812		8	1	11	15	12/69	265	80	345	NA
	820		8	1	6	13	10/70	850	495	1,345	NA
	1600 Series		8	1	5	11	2/72	365	95	460	NA
	3200		16	1	5	10	10/73	-	-	-	NA
	3230		16	1	8	16	10/73	-	-	-	NA
	32/5		16	1	10	20	3/74	-	-	-	NA
	Totals							2,492	905	3,397	NA

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AS OF JULY 1, 1973

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	CLASS	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Mini Comp	Administrator-2		16	3	35	52	12/70	NA	0	NA	NA
	MD-708		8	1	5	7	8/70	25	0	25 +	NA
	Multi User-E		16	3	67	85	11/70	NA	0	NA	NA
	Multi User-I		16	3	40	58	1/71	NA	0	NA	NA
Modular Computer Systems	Modcomp-I		16	1	6	11	10/71	320	0	320	NA
	Modcomp-II		16	2	9	27	3/71	210	0	210	NA
	Modcomp-III		16	3	12	65	12/70	105	0	105	NA
	Modcomp-IV		16/32	2	18		2/74	-	-	-	NA
Mohawk (Atron)	501	*	8	2	8	35	9/69	165	20	185 +	NA
Monitor Data	MD/708		8	1	3		8/70	NA	0	NA	NA
Motorola Comm Div.	MDP-1000		8	1	8	19	2/69	50	0	50 +	NA
Nuclear Data, Inc.	ND-812		12	1	7	15	3/71	360	5	365	NA
Omnicomp Computer Corp.	Omnus-1		16	1	8	12	8/71	NA	0	NA	NA
Omnitec (BIT)	480		8	1	6	17	12/66	195	3	198	X
	483		8	2	9	33	1/70	100	35	135 +	NA
Prime	100		16	1	5		2/73	NA	0	NA	NA
	200		16	2	6	36	10/72	NA	0	NA	NA
	300		16	1	12		8/73	-	-	-	NA
Qantel Corp.	Qantel-V	*	8	2	14	26	6/70	250	0	250	200
Raytheon Data Systems	703		16	1	13	23	10/67	175	35	210	X
	704		16	1	10	18	3/70	290	80	370	NA
	706		16	2	19	30	5/69	75	17	92	X
	PB-250		22	2	33	48	12/60	115	20	135	X
	PB-440		24	4		140	3/64	20	2	22	X
	PB-520	b	24	4		128	10/65	26	1	27	X
	Totals							701	155	856	NA
Redcor Corp.	RC-70		16+2	2	15	30	7/68	125	15	140	X
Rolm Corp.	1601	k	16	2	13	28	3/70	400	50	450	NA
Sanders	Series-200		16+2	4		120	3/69	NA	NA	NA	NA
	Series-800		16				12/71	NA	NA	NA	NA
Spear	Microlinc		12	3	46	57	6/66	33	3	36	X
Spiras Systems/USM	65		16	2	19	40	8/69	25	2	27 +	X
Sys. Computer Corp.	500		8				6/72	NA	0	NA	NA
	1000		8	1	4		1/71	400	0	400 +	NA
	1500		8				6/72	NA	0	NA	NA
Systems Engineering Labs	810		16	2	38	45	9/65	24	6	30	X
	810-A		16	3	18	90	4/67	236	10	246	X
	810-B		18	4	30	150	12/68	168	10	178	X
	840		24	3	65	80	11/65	3	0	3	X
	840-A		24	3	60	75	8/66	36	4	40	X
	840-MP		26	4	49	260	12/67	33	0	33	X
	71		16	2	15	48	8/72	160	45	205 +	NA
	72		16	2	20	45	8/70	28	8	36	NA
	85		32	4	150	240	7/72	9	1	10	NA
	86		32	4	200	325	6/70	32	4	36	NA
	88		32	4	350	600	3/71	3	1	4	NA
	Totals							732	89	821	NA
Tenet	210		32	4		380	8/71	NA	0	NA	NA
Texas Instruments	960		16	2	14	30	6/70	20	0	20 +	NA
	960-A		16	1	3		11/71	NA	0	NA	NA
	980		16	2	17	40	5/68	100	0	100 +	NA
	980-A		16	1	4		5/72	NA	0	NA	NA
Ultimacc	Disc	1 *	16	3	50	59	8/71	45	0	45	34
Unicom, Inc.	CP-8A		8	1	3		2/70	95	12	107	NA
	CP-8B		8	1	3		3/70	67	8	75	NA
	CP-8C		8	1	5		3/70	122	15	137	NA
	CP-8D		8	1	7		4/70	18	1	19	NA
Unicomp, Inc.	Comp-16		16	2	11	29	6/70	26	0	26	X
	Comp-18		18	2	12	38	8/70	38	0	38	X
Univac (EMR)	6130/6135		16+2	4	85	200	3/66	60	38	98	X
	6140/6145		16	4	60	120	/73	NA	NA	NA	NA
	6020		24	4	72	175	4/65	13	3	16	X
	6040		24	4	98	225	7/65	9	1	10	X
	6050		24	4	123	360	2/66	17	6	23	X
	6070		24	4	240	600	10/65	1	3	4	X
Varian	73		16	3	13	75	11/72	85	5	90	100
	520/i		16	1	6	13	9/68	310	140	450	X
	610		12	1		15	7/64	10	0	10	X
	620		16	2		37	11/65	75	5	80	X
	620/f		17+1	1	11	25	11/70	150	25	175	60
	620/f-100		16	1	10	22	6/72	115	20	135	70
	620/i		16+2	1	10	20	6/67	1,600	85	1,685	X
	620/L		16	1	5	12	5/71	670	170	840	200
	620/L-100		16	1	6	14	6/72	220	45	265	135
	R620/i		16+2	2	17	28	6/69	75	5	80	Neg
	R622/i		16+2	2	15	30	7/68	115	15	130	X
	Totals							3,425	515	3,940	565
Varisystems	PAC-16	m	16	1	4		9/69	20	0	20 +	NA
Wang Labs	3300 Basic		8	2	14	40	4/71	65	0	65 +	NA
Westinghouse	P-50		14	1	16	23	8/64	203	19	222	X
	P-250	n	16	3	40	62	9/67	58	10	68	X
	P-500 Series		18	4	85	110	6/63	39	6	45	X
	P-2000		16	2	10	27	8/69	157	44	201	NA
	2500		16	2	10	30	11/71	105	13	118	NA
	Totals							562	92	654	NA
Xerox	92		12	3		90	4/65	42	17	59	X
	910		24	4		120	8/62	160	15	175	X
	920		24	4		150	9/62	105	33	138	X
	925		24	4		200	12/64	11	2	13	X
	930		24	4	80	400	6/64	110	12	122	X
	CE-16&A		16	1	8	23	6/69	55	5	60	NA
	CF-16/A	o	16	1	8	17	11/70	50	5	55 +	NA
	Sigma-2		16	4	24	125	12/66	210	40	250	X
	Sigma-3		16	4	28	140	1/70	200	60	260	NA
	Totals							943	189	1,132	NA
XLO	Eight		8	1	4		1/71	50	0	50 +	NA
TOTALS								66,069	17,184	83,253	

Notes:

a. cross licensed version of Microdata-800
b. cross licensed version of Interdata-1
c. cross licensed version of Interdata-4
d. cross licensed version of Interdata-70
e. inc. Microdata - 1600
f. utilizes 2116-B
g. utilizes 2114-B or 2116-B
h. utilizes 2116-B (RTES)
i. utilizes 2115-A or B (Educ. Basic System)
j. utilizes two H-316's
k. cross licensed ruggedized version of Data General - Nova
l. utilizes Data General 1200
m. Mfr. by Photon, Inc.
n. utilizes Xerox - Sigma 2
o. utilizes CAI-116
* primarily sold as "Small Business Computer"

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• EXECUTIVES FROM FOUR MAJOR MAINFRAMERS -- Control Data, Honeywell, NCR, and Univac, with Burroughs conspicuously absent -- recently met jointly with attorneys from the Justice Department to plead for fast action in the government's antitrust suit against IBM. More to the point, they asked for pre-trial measures that prevent IBM from increasing its market share until the issue is settled.

In essence, the four companies say they can't compete in today's marketplace -- except at the sufference of IBM. They talk about the "possibility of restoring competition" to the marketplace, and voice a common fear that relief will not arrive in time to save them from extinction. Even if they manage to survive until 1980 -- the earliest probable date for a final ruling against IBM, they think -- the four manufacturers fear that a poorly conceived attempt to break up their adversary might do them more harm than good.

There's no doubt all four would like to see IBM fragmented -- but only under a plan that would give them some chance of holding their own against IBM's uninhibited successors. The non-IBMers pale at having to compete against not one, but perhaps half a dozen "biggies" with mutually compatible product lines and a ready-made stranglehold on the market. That's what they believe would happen if the Justice proposals of a year ago were put into effect.

The smaller companies also fear IBM's suddenly turning on them if it finds itself cornered by the government. Having nothing further to lose, they claim, the huge mainframer would pull out all stops and crush its competition during the years of appeal -- giving its successors the whole pie. So, hoping to find at least temporary shelter against upheavals ahead, the four companies asked Justice to seek a court-ordered "freeze" on IBM's relative size as well as interim restraints on IBM's marketing behavior.

• IN OTHER LEGAL DEVELOPMENTS, Judge David Edelstein set Oct. 7, 1974 for the start of the U.S. vs IBM trial, stating "no delays will be permitted except for very unusual circumstances." +++ And at presstime, Judge A. Sherman Christensen, presiding over the Telex/IBM skirmish, had called for a hearing in Salt Lake City. His appealable decision was expected to be filed over the weekend.

• ITEL, IN A MOVE IT CLAIMS WILL STABILIZE the market for large used computers, has become a used computer dealer. Itel will now buy user-owned 370/155s or larger machines at "stable" prices, recondition and reconfigure the equipment if necessary, and hold it until an appropriate buyer comes along. By serving as a "buffer" between the supply and demand for big machines, Itel says it will help eliminate the unpredictable price fluctuations that tend to appear when more than one large used system happens to reach the open market at the same time. But Itel admits that its biggest problem may be finding enough used 370s to meet demand. Used 155s -- at relatively low prices -- are eagerly snapped up by customers who need good-sized computers but aren't interested in virtual storage.

• FABRI-TEK, AN INDEPENDENT manufacturer of add-on core memories, has agreed to take over Data Recall from its parent, Computer Investors Group. In return, CIG will purchase Fabri-Tek's installed base of IBM plug-compatible memories and, in the future, will buy, distribute, and service memories built by Fabri-Tek and Data Recall. The deal lets Fabri-Tek concentrate on manufacturing, with an expanded product line, and shifts CIG's focus to finance and marketing while broadening its base. Each now claims leadership in its new "sector" of the industry.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" NOVEMBER 20,1973 • VOL.9,NO.3 P.J.McGOVERN,EDITOR

How many PCM drives are there?

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IBM "WINS" SECOND ROUND IN TELEX COURT FIGHT; DAMAGES REDUCED $93 MILLION; INJUNCTIVE RELIEF SOFTENED CONSIDERABLY

When the decision in Telex vs. IBM was first handed down (EDP/IR Sept.24,1973), many observers noted that the far-reaching injunctive relief was much more significant to IBM than the monetary damages of just over $350 million. If that indeed was the case, then IBM won a major battle via the post-trial "appeal" held by the district court. In a decision announced Saturday, Nov.10, Judge A. Sherman Christensen modified injunctive relief (see pages 4 and 5) to terms IBM calls a return to previous practice. And the Judge even chopped $93 million off the trebled damages. To many, therefore, it looked like an IBM "victory."

The fact remains, however, that IBM still owes Telex $259.5 million -- plus $1.2 million in attorneys' fees . . . and Telex owes IBM almost $22 million for trade secret violations (nothing about the countersuit decision was changed).

The $31 million reduction in monetary damages (before trebling) represents the Judge's attempt to correct his "substantial error" -- not considering the effect of Telex' theft on its antitrust damages. Thus, he deducted $17.5 million as the competitive advantage unlawfully obtained by Telex from its trade secret theft; said the injunctive relief was worth $6 million; and knocked off a final $7.5 million for additional unfair competitive advantage.

Injunctive relief against IBM was narrowed. Rather than being permanent, the restriction against penalties for cancellation of fixed-term leases was limited to a three-year duration; further, this restriction now applies only to CPU-connected peripherals. The provision for disclosure of interface specs now calls for IBM "in good faith" and "on request" to make details available at "first customer shipment" of a CPU or its channel. IBM must also make available information "in the event that a subsequently shipped" peripheral changes an interface. This probably is meant as a guard against microcode changes via floppy disks.

On separate pricing, IBM must now continue to price separately 370 memories "not a single product with the CPU." And in the pricing area, the decree has been clarified and narrowed; IBM now must make "a good faith effort to set prices . . . with a substantially equivalent profit objective" rather than a uniform markup. It also must separately price separate products, but the Court adds that it does "not intend to inhibit technological changes" that may alter product definitions.

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TAPE DRIVES FOR IBM SYSTEMS
(Based on AMENDMENTS TO FINDINGS OF FACT in Telex vs. IBM)

	12/70	6/71	12/71	6/72	12/72
240X Type					
IBM owned (On Rent)	20,182	18,045	15,859	10,771	5,996
User owned (IBM)	3,900	4,058	4,369	4,656	5,035
3rd Party leased (IBM)	5,554	5,565	5,405	5,236	4,911
Peripheral Company	4,088	4,919	4,705	4,059	3,602
TOTAL	33,724	32,587	30,338	24,722	19,544
2420 Type					
IBM owned (On Rent)	6,744	7,695	7,319	3,698	1,290
User owned (IBM)	304	332	344	367	384
3rd Party leased (IBM)	42	46	46	38	26
Peripheral Company	81	749	1,216	1,361	1,263
TOTAL	7,171	8,822	8,925	5,464	2,963
3420 Type					
IBM owned (On Rent)	0	0	2,937	12,845	20,990
User owned (IBM)	0	1	124	320	881
3rd Party leased (IBM)	0	0	0	13	57
Peripheral Company	0	0	10	696	2,087
TOTAL	0	1	3,071	13,874	24,015
All Tape Types above					
IBM owned (On Rent)	26,926	25,740	26,115	27,314	28,276
User owned (IBM)	4,204	4,391	4,837	5,343	6,300
3rd Party leased (IBM)	5,596	5,611	5,451	5,287	4,994
Peripheral Company	4,169	5,668	5,931	6,116	6,952
TOTAL	40,895	41,410	42,334	44,060	46,522

Also important to IBM were the additional findings of fact, and it quickly distributed copies of pages that discussed pricing. This indicates an appellate thrust that profitability negates monopoly. One paragraph inserted into the findings begins: "There is no evidence that IBM reduced prices below cost and a reasonable profit." But it ends: "Those price reductions are found to be predatory."

Also in the amended findings was a detailed breakdown of plug-compatibles, by type, as to method of ownership (tables above and right). This material, taken from evidence introduced by IBM, amazingly seemed to show a lower market share for PCMs at yearend 1972 than the manufacturers claimed for themselves. During the last week, EDP/IR and researchers at IDC have contacted the independent manufacturers, and present their estimates (lower table, right) alongside those found by the Court (based on IBM evidence). The "revised" numbers don't substantially change the general pattern, but they do reduce IBM's "monopoly" in plug-compatible peripherals by a few percentage points. Any port in a storm, it would seem.

IBM explained, as this issue went to press, that the numbers were based on several sources and would, indeed, be among the factors to be discussed in a forty- or fifty-page petition for permission to appeal about to be filed in the 10th Circuit Court in Denver. The appellate process there is expected to go quickly -- oral arguments in late winter, a decision by early summer, a chance to get on the Supreme Court's docket for next fall. Of course, settlement is a possibility.

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DISK SPINDLES FOR IBM SYSTEMS
(Based on AMENDMENTS TO FINDINGS OF FACT in Telex vs. IBM)

	12/70	6/71	12/71	6/72	12/72
2311 Type					
IBM owned (On Rent)	10,712	8,196	6,464	5,343	4,326
User owned (IBM)	3,426	3,507	3,662	3,838	4,016
3rd Party leased (IBM)	4,497	4,499	4,348	4,200	4,035
Peripheral Company	2,194	2,569	2,576	2,572	2,536
TOTAL	20,829	18,771	17,050	15,953	14,913
2314/2319 Type					
IBM owned (On Rent)	32,991	32,552	33,865	30,656	27,066
User owned (IBM)	7,009	7,709	8,124	8,493	9,326
3rd Party leased (IBM)	7,051	7,109	7,135	7,018	6,595
Peripheral Company	2,639	8,179	9,826	11,395	11,824
TOTAL	49,690	55,549	58,950	57,562	54,811
3330 Type					
IBM owned (On Rent)	0	0	2,400	6,412	11,518
User owned (IBM)	0	2	374	606	972
3rd Party leased (IBM)	0	0	14	56	148
Peripheral Company	0	0	0	0	85
TOTAL	0	2	2,788	7,074	12,723
All Disk Spindles above					
IBM owned (On Rent)	43,703	40,748	42,729	42,411	42,910
User owned (IBM)	10,435	11,218	12,160	12,937	14,314
3rd Party leased (IBM)	11,548	11,608	11,497	11,274	10,778
Peripheral Company	4,833	10,748	12,402	13,967	14,445
TOTAL	70,519	74,322	78,788	80,589	82,447

PLUG COMPATIBLE PERIPHERALS INSTALLED, U.S., YEAREND 1972
(International Data Corporation Estimates, Based on Reports from Suppliers)

	Tape Drives			Disk Drives		
Company	240X	2420	3420	2311	2314/19	3330
Ampex	800	250	100	-	1,200	-
CalComp	-	-	250	350	3,850	50
Memorex	-	-	-	1,120	6,230	50
Potter	2,500	50	100	-	500	-
Storage Technology	-	-	2,800	-	-	100
Telex	1,500	400	1,000	250	3,330	150
Others	700	300	50	1,050	1,500	50
TOTALS	5,500	1,000	4,300	2,770	16,610	400
COURT FINDINGS:	3,602	1,263	2,087	2,536	11,824	85

SOME QUESTION SEEMS TO EXIST as to the number of plug-compatible tape and disk drives used on IBM/360 and 370 computers in the U.S. "Findings" from the Court (pages 2 and 3, top), based on IBM-introduced evidence, don't agree with IDC's headcount by manufacturer for yearend 1972. Numbers in lower table (above) have been verified and cross-checked among PCMs. See text for more comments on this

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AMENDED JUDGMENT AND DECREE

The issues having been duly tried to the court, findings of fact, conclusions of law and judgment and decree having been filed and entered on September 17, 1973, timely motions to amend such findings of fact, conclusions of law and judgment and decree having been filed, argued and considered by the court, and the court having made certain amendments and supplements to its findings of fact and conclusions of law; now, accordingly, IT IS HEREBY ORDERED, ADJUDGED AND DECREED:

1. That plaintiffs, The Telex Corporation and Telex Computer Products, Inc. have and recover judgment of and from the defendant International Business Machines Corporation in the sum of $259.5 million, after the found actual damages have been trebled as required by law, together with attorneys' fees in the sum of $1.2 million, and stipulated costs of court in accordance with the agreement of the parties heretofore entered on the record.

2. IBM is hereby enjoined for a period of three years from the date of this judgment from entering into or enforcing any contractually specified termination charges or liquidated damages which it otherwise might be entitled to collect because of termination of any long term lease agreement entered into between IBM and any of its end-user customers, with respect to IBM EDP peripheral products that are cable connected to any IBM CPU or its channel.

3. IBM is enjoined and required in good faith to make available on request, at the time of first customer shipment of an IBM CPU or its channel, information describing the design of the electronic interface for such product (including the details necessary to describe the characteristics, timing and sequencing of all signals to be interchanged, together with the function of such signals and the expected response to such signals transferred at the interface between such IBM CPU or its channel and the EDP peripheral products cable connected to it) and, in the event that a subsequently shipped IBM EDP peripheral product changes that interface, IBM shall make changes in the above information available at the time such product is shipped.

4. IBM is enjoined and required to continue to price separately those System 370 memories which are not a single product with the central processing unit.

5. IBM is enjoined and required to price separately its separate EDP products, including but not limited to CPU's, memories (as set forth in paragraph 4), tape products and their controllers, disk products and their controllers, printer products and their controllers, and communication controllers.

6. Where it offers a separate EDP peripheral product cable connected to an IBM CPU or channel in a separate box and a substantially equivalent version made from substantially common parts integrated into another product, IBM is enjoined and required to continue to price the integrated version separately from the product into which it is integrated, and is further enjoined and required to make a good faith effort to set its prices for both such versions with a substantially equivalent profit objective, and with cost and profit objectives being measured on an equivalent basis.

7. Neither paragraph 4, 5, nor 6 hereof is intended to require the separate pricing of anything which would not be regarded as a separate product pursuant to Section 3 of the Clayton Act and provided further in this connection that the court does not intend to inhibit technological changes which may alter the definition of what today may be a separate product.

8. IBM is enjoined from adopting, implementing or carrying out predatory pricing, leasing or other acts, practices or strategies with intent to obtain or maintain an illegal monopoly in a relevant market for EDP peripheral equipment plug compatible to its CPU's, or any relevant submarkets thereof, in violation of Section 2 of the Sherman Act.

9. The foregoing injunctions are intended to be effective only within the

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United States. They and any changes, modifications or amendments thereof may be enforced, construed or considered only upon motion duly made by [Telex] or [IBM], or their successors in interest, and such motions shall be made on at least twenty days' written notice.

10. International Business Machines Corporation shall have and recover from Telex Corporation and Telex Computer Products, Inc., the total sum of $21,913,776, made up as by the conclusions of law shown, together with attorneys' fees for the adjudged copyright infringement in the sum of $3,000, and costs in accordance with the stipulation heretofore made of record.

11. The Telex Corporation and Telex Computer Products, Inc., are enjoined and required:

a. To return to IBM all IBM documents and all Telex documents containing IBM confidential information which are in Telex's custody or under its control, and to destroy all copies of Telex manuals under its control or in its custody which infringe IBM copyrighted manuals.

b. To refrain from hiring or soliciting any IBM employee for a period of two years without approval from the court.

c. To refrain from copying any IBM copyrighted materials.

d. To refrain from soliciting or using any IBM confidential or proprietary information.

e. To refrain from assigning any former IBM employee employed now or in the future by Telex to the development or manufacture of products functionally equivalent or similar to those on which such employee worked at IBM for a period of not not less than two years following the termination of his employment with IBM.

12. Notwithstanding the undetermined claims relating to foreign markets, the court, pursuant to Rule 54(b) Fed.R.Civ.P., hereby determines that there is no just cause for delay in the entry of this judgment, and the Clerk is hereby directed to enter final judgment in accordance with the foregoing, subject to immediate appeal. A stay of execution is hereby granted subject to disposition of defendant's motion of September 26, 1973, pursuant to Rule 62(d) of the Federal Rules of Civil Procedure for an order suspending injunctive relief against defendant pending appeal or, in the alternative, for an order requiring plaintiffs to provide security in the amount deemed appropriate by the court, and subject to the disposition of other motions, if any, for stay or supersedeas in connection with an appeal of this judgment by any party.

13. Against the possibility that it should be determined that reserved claims with reference to foreign markets are not sufficiently separate as to permit the invocation of Rule 54(b), Fed.R.Civ.P., and that despite the provisions of 28 U.S.C. §1292 (a)(1) with reference to appeal of interlocutory injunctions, the antitrust and trade secret damage awards herein otherwise would not be subject to immediate appeal, the court hereby finds and states:

That it is its opinion that all of the provisions of the foregoing orders and judgment, including the question of antitrust and trade secret damages, as well as the injunctions, involve controlling question of law as to which there is substantial ground for differences of opinion, and that an immediate appeal from said orders and the foregoing judgment as a whole, and each part thereof, may materially advance the ultimate determination of this litigation; that the reserved claim as to foreign markets likely will involve questions concerning damages as well as injunctions the same as, or similar to, those which would be decided in an appellate review of the foregoing judgment, and that unless and until all such questions are decided on appeal from this judgment there likely would be great extra expense and the expenditure of extended time and effort in discovery concerning, and adjudication of, the foreign market claim much of which may be rendered either more certain and expeditious, or needless, if the foregoing judgment is reviewed in its entirety.

-- Dated this 9th day of November, 1973

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COMPUTER SECURITY: POTENTIAL PROFITS FROM A GROWING PROBLEM

One man's headache is another man's profit -- as every aspirin maker knows. And one of the computer industry's nagging headaches -- security -- has given birth to a potentially sizable new market in "automated authentification" equipment designed to foil criminal attempts to misuse computerized data. With the growth of autotransaction and electronic funds transfer networks, the need for reliable ways for computers to identify the people to whom they talk, pay money or authorize credit is becoming acute.

The experiences of credit card companies have already underscored the problem -- some companies are losing as much as half their gross profits to theft and fraud, and many may be driven out of business by the end of the decade unless reliable authentification techniques are developed, according to the Stanford Research Institute. Security headaches will grow worse as computerized record keeping becomes universal and criminals grow more sophisticated.

Several computer-related frauds of enormous proportions came to light within the past year and helped focus public attention on all aspects of the security problem. Three data processing personnel of Equity Funding Life Insurance Co. were among 22 employees indicted recently for falsifying insurance policies to the tune of $100 million; two large banks are still looking for a man who walked off with several million dollars after non-existent funds were fraudulently "transferred" into his accounts over the nationwide Bank Wire.

These examples are spectacular, but the total problem is much larger. Some estimates put reported losses from fraud and embezzlement in the U.S. at $2 to $3 billion a year -- and undetected losses may drain away far more. Unfortunately, computers can be perfect dupes for the unscrupulous, and their erasable memories make relatively safe havens for sleight-of-hand accountants.

A simple solution to these problems doesn't exist. The market is waiting with open arms for inventors to come along with better mousetraps to fill myriad security needs -- and it's been estimated that sales of security-related systems will reach $500 million a year by 1980. Some of the most important areas currently under research are:

- Identification techniques that take advantage of unique physical characteristics (fingerprints, voiceprints, lipprints, etc.); coded ID cards or "handshaking" protocols to identify users to machines.

- Cryptography and electronic scrambling devices capable of insuring safe transmission of data over networks or between computers without tampering by sophisticated wiretappers.

- Auditing and logging systems that document and crosscheck all processing and activities within computers or networks, quickly detecting many types of unauthorized use.

IBM, after years of experimenting with such exotic devices as voiceprint decoders, now thinks it may have found a workable answer to the identification problem. Researchers at the Watson Research Center believe they can prove that the series of vertical accelerations each person makes in writing his signature is "unique, invariable and unforgeable" -- and could be quickly measured on a small, inexpensive electronic writing pad from any remote location.

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The giant mainframer is far from ready to demonstrate such a device -- but when the signature validator or something like it comes along, the industry will have leaped an important hurdle on the way to a cashless society. Meanwhile the American Bankers Association has settled on magnetically coded ID cards as the best immediate solution and commissioned an extensive study of card security, anti-counterfeiting techniques and encryption to protect computer communications.

On-line networks will be an essential part of any long-range solution to the fraud problem -- and will generate new sales of mini-based switching systems, data storage equipment and encryption devices. Networking will permit instant credit and identity verification on a nationwide scale, leaving few loopholes for fast-traveling card thieves, counterfeiters and "deadbeats" to slip through.

Naturally, schemes of this sort raise concern in the minds of those involved in the controversy over personal privacy. But privacy is a political question, while the problem of keeping valuable data safe from misuse or destruction falls squarely on the shoulders of managers and engineers.

Communicating in code

IBM introduced message encryption to autotransaction this summer with its new automated bank teller. The autoteller dispenses cash to bank customers after checking with a central computer to make sure withdrawals are covered by their balances. If communications between the computer and autoteller weren't in code, a clever wiretapper might be able to access bank records; worse, he might easily learn to empty autotellers of cash with false "go ahead" signals.

IBM experts believe it will be at least another year before criminals learn enough to start wiretapping bank networks, but the problem is certain to crop up and users are worried about it. Customers also worry about "eavesdropping." Using sophisticated equipment, an eavesdropper in theory could monitor stray signals generated by electrical pulses as they move through wires and listen in on computer messages. But IBM is convinced this technique is too tricky and expensive for would-be eavesdroppers to use effectively.

Snaring embezzlers

Methods for auditing manually-kept accounts for embezzlement and fraud are well established. But the use of similar techniques in electronic data processing has lagged -- partly because system analysts and programmers are a new breed of accountant and dishonest DP personnel are a new breed of criminal. Many managers are just beginning to be impressed with the need for effective auditing, and only sad experience is teaching them what to look for.

Nevertheless, security experts say that sensible logging and checking procedures would be enough to counteract most computerized embezzling -- and the computer itself, properly used, can be a powerful tool for detecting abuses of data. But careful checks of people allowed access to computers has to be the front line defense, since systems are never smarter than their designers.

A number of software houses and auditing firms have moved into the computer security field with systems especially devised to catch anyone who tries to steal money, information or computer time. Computer Audit System's CARS package, for instance, randomly samples and checks data in large files under independent control of the auditor.

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EDP INDUSTRY NEWSFRONT...

• THE SUDDEN DEMISE OF PITNEY BOWES-ALPEX INC., third largest manufacturer of retail point-of-sale terminals, sent a shockwave through the young but burgeoning autotransaction industry last week. Formed in 1970 as a joint venture between Pitney Bowes and Alpex Computer Co., PB-A established an early foothold in the retail market below the giant, nationwide chain level. As of October, it had installed nearly 6,000 terminals and reported backlogs of $23 million.

On the other hand, PB-A had accumulated losses of $28 million since 1970 on revenues of $29.4 million. So, after taking a look at the competitive prospects for the next few years, Pitney Bowes -- having purchased majority ownership of PB-A in July -- decided to throw in the towel and write off an overall loss of $37 million on the venture. Spokesmen said the company foresaw operations continuing at a loss for several years and in need of "substantial investment."

The announcement named no names, but IBM's recent announcement of totally integrated store management systems -- and Univac's takeover of RCA's experimental POS project for supermarkets -- undoubtedly loomed large in Pitney Bowes' decision. PB-A says it will try to terminate its service contracts and arrange for maintenance of systems currently installed. The effect on customers may not be too severe, however. In a spot check last week, AUTOTRANSACTION Industry Report, sister newsletter of EDP/IR, found that many customers had either just completed delivery of orders, or had taken few if any deliveries; they didn't seem to be as surprised as might have been expected. The action is interpreted as a sign of consolidation in this most mature sector of the autotransaction industry.

• NEW PRICE CUTS WERE ANNOUNCED this month by DEC and Hewlett-Packard, the two largest mini manufacturers -- underscoring the steady trend toward lower hardware prices. DEC slashed OEM prices for its PDP-8/M with 32K words of memory by 40% -- to $3,328 -- and announced somewhat smaller cuts down the line. HP reduced memory prices by as much as 60%, yielding an average system price cut of 10%. It also cut the price for microprogramming accessory programs.

Both manufacturers attributed price cuts to economies of volume production and expansion of overseas core-stringing plants -- with no mention of outright price warfare. The only exceptions to the downward trend in the mini industry are prices of electro-mechanical peripherals, inflated by rising component costs.

• IN A MOVE TO CONSOLIDATE its international marketing operations, Burroughs has agreed to buy half interest in Takachiho Burroughs Ltd., its exclusive distributor in Japan since 1954. Burroughs sells equipment in 123 countries, primarily through wholly owned subsidiaries in the advanced European markets. In Japan, however, postwar policies prohibited Burroughs from acquiring an interest in its highly successful distributor, which grossed $90 million from sales of Burroughs products to Japanese customers in 1972. Now, Burroughs hopes to win Japanese government approval for joint ownership of the distributor.

• PACKET COMMUNICATIONS INC. BECAME THE FIRST company authorized to develop a commercial packet switching network last week. The landmark ruling from the FCC designated PCI a common carrier and authorized AT&T, for the first time, to lease lines to "hybrid data service vendors" for re-marketing at value-added rates. As part of the package, PCI is prohibited from offering data processing services or building its own communications lines. EDP/IR is preparing a report on value added networks (VANs) and other communications carrier developments.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 6,1973 • VOL.9,NO.4 P.J.McGOVERN,EDITOR

TELECOMMUNICATIONS POWER STRUGGLE HEATS UP AGAIN; COMPETITION BRINGS BETTER TECHNOLOGY AND LOWER RATES

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...the burden of the regulatory process now is to define the ground rules by which competition [in the telecommunications industry] and its potential public benefits may become a reality rather than simply a regulatory fantasy of the FCC. -- Bernard Strassburg, Chief, Common Carrier Bureau, Federal Communications Commission.

The prospect confronting us is not free and open competition as an alternative to monopoly, but rather a third alternative with the virtues of neither and the disadvantages of both -- and this is regulated competition, a division of the marketplace arbitrarily imposed and artificially maintained. -- John DeButts, Board Chairman of AT&T, in a speech calling for "a moratorium on further experiments" to increase competition in the telecommunications industry.

Strong words are becoming the stock in trade of telecommunications executives these days. Ma Bell's as mad as the proverbial wet hen -- but her ruffled feathers look like a healthy sign for data communications. Finally forced to compete for data transmission and private network dollars, AT&T is on the move. And as the battle between the monopoly carriers and their would-be competitors moves from the regulatory arena into the marketplace, the computer industry -- with its communications dollars in hand -- stands on the sidelines waiting to place its bets.

The past few weeks have seen a number of important developments on the rapidly changing telecommunications scene:

- The FCC authorized Packet Communications Inc. to develop the first commercial packet switching network and indicated it will act swiftly to let other new "value-added" carriers enter the field. Equally important, the Commission authorized AT&T, for the first time, to lease lines to networking services for remarketing at value-added rates.

- AT&T formally filed new "hi-lo" tariffs designed to make its private line rates competitive with the new specialized carriers'. The hi-lo rate structure will reverse Ma Bell's traditional policy of averaging transmission costs among all users, subsidizing low volume routes with profits from high volume routes between major cities.

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THE FUTURE FOR SPECIALIZED COMMON CARRIERS MAY NOT BE SO BRIGHT

Widely published estimates of a potential $1.5 billion market for private line services by 1975 are unrealistically high, according to a study by the Center for Communications Management Inc. Even if demand reaches that level in an uncertain economy, the specialized carriers won't be able to touch most of it, the study concludes. Still nailed down by AT&T and Western Union will be:

Revenues from low density routes	$750 million
Revenues from other routes not served by SCCs	250 million
Revenues from FX and SCC interconnections	150 million
Total market for AT&T and WU alone	$1,150 million
Market open to SCC competition, minus SCC's discount	$315 million

- Microwave Communications Inc. (MCI) sued AT&T in federal court to force the big carrier to provide tie-in services between customers and MCI's new microwave network on a non-discriminatory basis.

These events are signs of the new free-for-all atmosphere in the formerly staid world of telecommunications, where AT&T and its operating companies ruled without challenge as regulated monopolies. The Bell System owns 85% of the nation's telephones and serves most of the metropolitan areas -- where high density is a plus. Bell's Long Lines Department controls virtually all the long distance communication in the country. Competition has come only nominally from Western Union, GTE and other independent phone companies that own a mere 15% of the telephones -- but serve 85% of the U.S. land area -- the low density crumbs from AT&T's table.

Until recently, the state and federal regulatory agencies that ruled rates, profits and services were thoroughly sold on the monopoly principle for common carriers. That picture suddenly changed in 1971, when the FCC approved MCI's plan to build its own private line microwave network and lure away Bell customers with lower rates and more flexible service. Thus the new era of "competition" in the transmission subsector began. The following status report on data carriage was prepared by EDP/IR with the assistance of Ronald Frank, communications specialist at Computerworld.

Computers opened the door

The advent of the computer had quite a bit to do with the FCC's change of tune. The wide-ranging Computer Inquiry -- begun in 1966 to help the FCC find out how telecommunications and data processing are related -- opened the Commission's eyes to the demand for competitively supplied data transmission, interconnection equipment and customized communications services. The complaints of frustrated computer users about the shortcomings of AT&T's offerings directly fathered the FCC's new determination to foster competition in the industry.

Competitors have been eager to accept the challenge. Bell's revenues from private line customers -- though less than 5% of its total -- is about $1 bilion a year and the use of private lines for data is growing 30% to 35% a year. Data sets on all Bell services grew from 7,000 in 1963 to 200,000 last year. The newcomers think they can not only corner much of this business for themselves, but speed its growth by leading the market instead of plodding in its wake.

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SCORECARD: THE SPECIALIZED CARRIERS

MICROWAVE COMMUNICATIONS INC. (MCI) broke the regulatory ice in 1971 to become the first "specialized common carrier" designated by the FCC. MCI has started service over its own microwave network to nearly a dozen cities and claims to have orders in hand for private line services worth $9 million a year. Recently MCI merged with a midwestern carrier, N-TRIPLE-C, and by 1975 will be operating satellite relays with Lockheed and COMSAT.

DATA TRANSMISSION CORP. (Datran) plans a nationwide all-digital switched network exclusively for data communication, with first service this month on the Houston-Dallas link. Despite its ambitious plans, the Wyly Corp. subsidiary's future looks uncertain in the face of AT&T's plans for a similar -- and competitively priced -- offering called DDS. Stiff competition can also be expected in a year or two from the first commercial packet switching networks. Datran is trying to have AT&T's offering delayed by court order until it can establish a firm foothold in the market.

SOUTHERN PACIFIC COMMUNICATIONS CORP., a subsidiary of the well-heeled railroad, is taking advantage of the private microwave network SP has already built along its rights of way. SP's approved network extends through the southwest, the Pacific coast and up the Mississippi to St. Louis. But SP has bigger plans -- it recently agreed to acquire UNITED VIDEO, the only southeastern specialized carrier, and took over the approved but undeveloped New York-Boston route of defunct Video Microwave Inc. SP says it will begin coast to coast service in April and eventually share Western Union's Westar satellite channels.

WESTERN TELECOMMUNICATIONS is now providing high speed data channels between El Paso and Los Angeles and plans to move north to Seattle and into the central Rocky Mountains. WCTI is diversifying into the bread and butter video transmission market, a staple that a number of carriers are falling back on. A recent satellite sharing agreement with Fairchild could give WTCI a link to the east coast from Denver.

The specialized common carriers

When the Chairman of AT&T called for a "moratorium" on further attempts to make telecommunications a competitive marketplace, he paid tribute to the potential power of the specialized common carriers. DeButts claimed that if MCI and other new carriers are allowed to proliferate, they will "cream off" $220 million in private line revenues from the established carriers by 1975 -- forcing up the cost of "plain old telephone service" to compensate.

AT&T, of course, opposed the franchising of MCI from the start. It lost that battle in 1971. But in September Ma Bell went back on the warpath -- apparently goaded by the news that MCI -- after less than two years in operation -- had taken over 80% of the private line traffic on the Chicago-St. Louis route. AT&T has asked the FCC for a public hearing and a reconsideration of the specialized carrier decision.

Bell argues that the specialized carriers aren't offering the more flexible business-oriented services they promised, but merely duplicating AT&T services. Whether the new carriers can show they actually are offering something different may become the key issue when the dispute gets to court.

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The specialized carriers are attacking a segment of the telephone companies' revenue base that's comparatively small -- but very profitable: the market in inter-city private lines reserved mostly for large companies that maintain in-house networks. Most of this traffic consists of voice and teletype messages, but computer data, the fastest growing segment, already earns $300 million a year for Bell.

For such users the sales pitch of the specialized carriers is very persuasive. A big customer can often save 30% on his phone bill -- under current Bell rates -- by making the switch. But he also takes some very real risks. With few exceptions the specialized carriers need local or foreign exchange telephone company lines to tie in their customers. And understandably, the phone companies haven't been bending over backward to supply them. AT&T claims it is complying with FCC orders to supply "local loops" to MCI, for instance, but is balking openly at supplying common control switching and private tie-in lines between foreign exchanges.

In any case, MCI says AT&T's tactics are blocking service to some of its customers and has told its stockholders it may have to draw on more credit to keep going until the issue is resolved. The FCC is clearly sympathetic to MCI -- but AT&T insists it shouldn't have to serve its competitors on the same basis as everyone else.

Ma Bell is fighting back

Whether the newcomers will be able to hold their own as Ma Bell awakens from hibernation and learns to throw her enormous weight around in a competitive environment is still a big question. But users of communications services have already benefitted from the new order of things. The Carterfone ruling -- allowing the interconnection of non-Bell equipment to Bell lines -- has brought improved, lower priced modems and terminals onto the market. Bell has responded with new PBX, key telephone and CRT offerings, and now, lower rates.

During 1974 Bell plans to offer its new Dataphone Digital Service (DDS) in 24 cities, first on a point-to-point, then on a multipoint basis. The telephone company began installing digital circuits for voice transmission in 1961 -- primarily within big cities -- but claims the use of these circuits for high capacity data transmission didn't seem economically feasible until 1970 or so. Thus, users have been forced to adapt voice grade, analogue lines for low speed, expensive and relatively unreliable data transmission.

Now, if the FCC approves, Bell will offer private line, full duplex synchronous digital transmission at up to 56 kilobits per second -- far more reliably and no doubt at far less cost than before. DDS will use existing digital circuits for local connections within cities. For long haul transmissions, the digital signals will "hitchhike" on currently unused portions of the microwave spectrum using Bell's new "data-under-voice" technique (DUV). With DUV, Bell will be able to offer end-to-end digital service without a big initial investment in long distance digital transmission lines -- yielding efficiencies that could drive Datran to the wall.

Datran is asking the FCC to prohibit AT&T from offering DDS for five years or until it's managed to establish a solid customer base. Datran says it saw the market first and should have a chance to compete in it. AT&T jeers back that competition is a two-way street.

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THE VALUE-ADDED NETWORKS (VANS)

PACKET COMMUNICATIONS INC. won FCC endorsement of the value-added network concept last month when the Commission approved its proposal for the first commerical packet switching network -- and okayed the use of lines leased from common carriers for its service (see story). Founded by engineers who helped design ARPANET -- the Department of Defense Advanced Research Project Agency's packet-switched network --for Bolt Beranek & Newman, PCI plans to begin service within 18 months.

TELENET COMMUNICATIONS CORP., a subsidiary of Bolt Beranek & Newman, also plans to take advantage of BB&N's ARPANET experience to develop a packet switching network similar to PCI's. Telenet filed its FCC application in October and expects relatively quick approval. It hopes to serve 18 cities by the end of 1975 and more than 60 cities by yearend 1977.

GRAPHNET INC. will use common carrier leased lines for a facsimile transmission service.

MCI DATA TRANSFER CORP. has been formed by MCI to develop a packet switching network to operate over MCI and other carrier lines.

PACKET SWITCHING ENTERS THE COMMUNICATIONS SPOTLIGHT

When the dust has finally settled, the FCC's approval of Packet Communication's plans for a commercial packet switching network last month may be marked down as the most significant development during the telecommunication industry's chaotic autumn of 1973. The decision certainly had at least one unique characteristic: everybody applauded it, including AT&T.

PCI's proposal represents a breakthrough on both the regulatory and technological fronts. From the regulatory point of view, it is the first "value-added network" (VAN) -- so called because PCI, rather than build its own transmission lines, will lease lines from established carriers and use them to supply a highly sophisticated data transmission service to end users at value-added rates. In conjunction with its approval of Packet, the FCC authorized AT&T, for the first time, to lease lines for third party use and resale.

On the technological side, the new network and others like it should offer users a data transmission service of unprecedented reliability and economy -- and no doubt open up entirely new and important applications in remote data processing, information retrieval and autotransaction -- especially for small users.

A split-second post office

Packet switching was first developed for ARPANET, a data communications network operated by the Department of Defense to connect computing centers of the government and universities across the country. ARPANET has proven the technology -- so private investors are lining up to back commercial versions.

The packet switching concept takes account of a basic difference between human and computer communication -- while human speech ties up a telephone circuit relatively continuously, computers tend to transmit in high volume "bursts." Most computers and terminals, in fact, rarely use point-to-point channels at more than 10% of capacity during a given connection; efficiency is often more

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like 1%. This waste of channel capacity is hard to avoid as long as communication requires the use of a dedicated circuit between the sender and receiver throughout the interaction. Packet switching eliminates open circuit traffic by restructuring the transmission process from the ground up.

A packet switching network can be visualized as an electronic post office that replaces mailmen with computers. Messages between computers and terminals on the network are broken up into "packets" of 1,000 bits apiece and sent out with a leader bearing the "addresses" of their destinations. The packets are passed from node to node in the network and automatically reassembled into the original message at the other end -- whereupon the receiver sends an acknowledgment shuttling back to the transmission point.

It sounds cumbersome -- but the whole process normally takes only a few tenths of a second. The packeting, routing and reassembling of messages is all done by computers and minicomputers integrated into the network and invisible to the customer. What's more, these computers perform sophisticated coding functions that make the network "transparent" to virtually any type of terminal or CPU -- allowing any machine to talk to any other connected machine without reformatting data. The system is inherently reliable because many alternate routes are available between remote points in case of line failure, and transmissions are essentially error-free.

Cutting communications costs

Packet switching is highly efficient for long distances because packets from many different users in one city can be loaded continuously onto high capacity links to other cities in random order -- like letters in a mail truck. A number of packets constituting one message might even travel to their destination by different routes. This procedure pushes channel use as high as 80%, cutting transmission costs dramatically. The reduced effect of distance on overall communication costs permits "postalized" rates based only on the number of packets sent, not how far they traveled.

All these characteristics of packet switching add up to enormous advantages for users. Random access to widely distributed data bases at low -- and predictable -- cost; efficient on-line transaction processing; on-line credit verification at a fraction of a cent per checkout; shared CPU power -- packet switching seems tailor made for such applications and will make many new ones feasible for the first time.

None of this is lost on AT&T and the other common carriers -- they see packet switched networks as a potentially strong stimulus to the growth of data communications, and as customers themselves. Neither PCI nor Telenet, its younger rival, plan to build any transmission facilities. They will lease lines from the major carriers and offer only the service of carrying messages from one place to another. The FCC has designated packet switching a "hybrid data communications service" in which the data processing activities are incidental to message switching.

PCI filed its application to operate a network with the FCC last January and won approval in eight months. Telenet got a later start, but the expected swift approval of filing may help the BBN subsidiary catch up. Both hope to be serving 18 to 20 cities nationwide by the end of 1975. Writing software, adapting hardware and setting up service organizations are the main jobs to be done.

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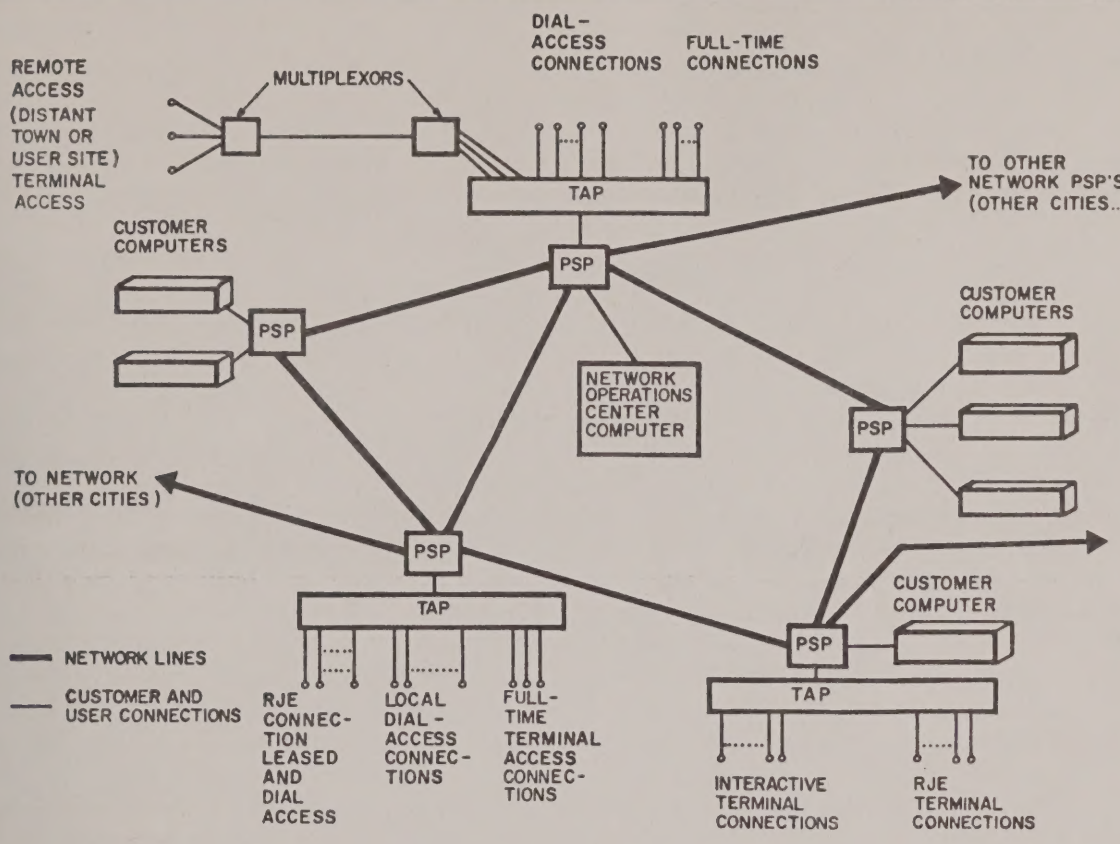

A PACKET SWITCHING NETWORK -- This Packet Communications Inc. drawing for the FCC shows a typical packet switching network structure. The "nodes" of the network are minicomputer-based packet switching processors (PSPs) that packet data from local users, tag the packets with addresses and feed them to the network's high capacity links -- and reverse the process for incoming data. The terminal access processors (TAPs) multiplex or concentrate data streams to and from customers' terminals. The TAPS also perform code translation and standardization functions that allow different types of terminals and computers on the network to communicate freely -- without changing the content of the messages. Each node has at least two separate links to the network, insuring access to all other nodes even if one link fails. PCI will lease 50 and 250 kilobit land lines for long haul routes; may add 1.5 megabit satellite channels when they become available.

Machine subsociety is on the way

It's been over a century since the telegraph put the Pony Express out of business and electronic communication began to reshape American life -- and less than a generation since the advent of electronic computing started another revolution. Today these two technologies are ready to join forces on a large scale, exploiting their natural kinship to form a nationwide "subsociety" of communicating machines.

The next two years will be critical in determining who, if anyone, will control this booming subsector as AT&T fights to keep its dominion -- now threatened from another quarter by a Justice Department antitrust inquiry -- and the new carriers meet the first real tests of their abilities to survive.

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EDP INDUSTRY NEWSFRONT ...

• IBM ANNOUNCED COST-OF-LIVING PRICE INCREASES that amount to two percent for most data processing products and services, five percent or more for typewriters. For computer users, the increase goes into effect immediately for purchases or new contracts for "application customizer services" . . . increases on rentals as well as for maintenance, education, and program products go into effect March 1, 1974.

Peripherals on fixed or extended term lease plans will continue at their contract price, but "for contract periods or extensions that commence on or after Nov. 26, 1973, the new monthly charges will be effective Mar. 1, 1974." Rules for the four-year term lease plan are similar, and equipment already ordered under TLP and delivered before Mar. 1, 1974 will retain old rates. Also, the increase doesn't apply to certain recently announced equipment -- the 3340 (Winchester) disk system, the 3740 (floppy disk) input system, the 3704 communications controller, the CPUs for the 115 and the System 3/15, and the families of terminal equipment for retailers, banks, and supermarkets.

IBM says "the price adjustments reflect the increasing cost of doing business and have been reviewed with the Cost of Living Council." Other mainframers report they have no price increase requests pending, but there have been sighs of relief that IBM's umbrella is lifted a little. EDP/IR's initial calculations indicate that, during 1974, the price increase -- effective only in the U.S. -- may mean an additional $90 million to IBM from data processing customers.

• THE COMPUTER INDUSTRY IS IN MUCH BETTER SHAPE to weather any economic downturn next year than it was prior to the 1971 recession, according to Honeywell Chairman James Binger. In a talk before a group of financial analysts in LA recently, Binger noted that -- in contrast to 1970 -- most users' systems today are working to capacity and have little slack to fall back on. The demands of energy conservation should increase use of computers and control systems to cut waste, and, if recession hits, new cost-cutting applications will be implemented even faster, he believes. Reporting the biggest backlog in Honeywell history, Binger said he expects Honeywell's earnings to continue growing at 15% or so a year.

• MAGNETIC BUBBLE MEMORY DEVICES should move closer to the production stage as a result of work North American Rockwell has in progress for the U.S. Army. The Army has given Rockwell a 22-month contract to develop production techniques for magnetic domain memories -- a promising mass storage technology that is still in the laboratory. The military wants to put bubble memories to work, and the Army has established specs for a practical production method. Rockwell's Electronic Research Division has been working with magnetic bubbles for several years -- as have mainframers and many other companies -- and no doubt expects to market a commercial version of the Army product.

• "MICROCOMPUTER" IS THE LATEST CONCEPT proposed by General Automation for its new product, the LSI-12/16 eight-bit, single-chip processor using a silicon-on-sapphire technology developed by North American Rockwell. Price? $495 in minimum OEM lots of 1,000 units per year. And as a small system -- with 32K of memory -- volume quantities would cost $1,500. First deliveries begin in January, 1974, with shipments approaching 1,000 a month by fall. Next? GA President Lawrence Goshorn says GAI should be shipping its 16-bit mini "in this technology" by the third quarter of 1974. The company, in staking a claim to the "microcomputer world" -- a nebulous area between standard minis and microprocessors -- claims to have leap-frogged both minicomputer and semiconductor manufacturers.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 20,1973 • VOL.9,NO.5 P.J.McGOVERN,EDITOR

Memorex joins the fray against IBM -- page 6

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LOCAL PROGRAMMABILITY FOR IBM 3740 DATA ENTRY SYSTEM HINTS INCREASED COMPETITION FOR INTELLIGENT TERMINAL MANUFACTURERS

> The 3741 data station . . . may turn out to be a popular buffered terminal in disguise. Look at the number it has been assigned!
> -- EDP/IR Feb.19,1973

When IBM press release writers call something a "family" -- as they did last winter in announcing the 3740 "versatile system for entering information into a computer" -- they seem to mean the characteristics of progeny that the word "family" commonly connotes. Also (it turns out, from Management Committee minutes introduced in the Telex case), the flexible diskette (floppy disk) that received so much attention was simply a technological replacement for the cassette.

So what? With the announcement this week of 3741 Models 3 and 4 -- "two programmable work stations that allow information to be captured and edited with increased ease and accuracy" -- IBM seems to be saying it has plans for the family's intelligent terminal members. In so doing, IBM apparently has adapted the product designed to offset Viatron into viable competition for Datapoint, Four Phase, Incoterm, Sanders, and Sycor. What!

Key to the new products -- one for stand-alone use (Model 3), the other for communications with a host CPU -- is ACL, the new Application Control Language. It "contains instructions for full arithmetic operations, input/output control, logical tests, branching and operator guidance." And no host computer is needed for object code creation . . . simply an ACL "translator" that leases for $35 a month under the two-year Extended Term Plan. The new models contain "additional read only memory for storage of the microcode used to supplement ACL instructions."

The new programmable units are being touted for applications that need additional editing, checking, or processing . . . data verification against internally stored tables . . . job order entry at remote warehouses for invoice or picking document preparation coupled with later use by a host for inventory control or accounts receivable. When not operating under ACL, the units perform data entry.

Since initial user surveys conducted by IDC, parent of EDP/IR, indicate 3740 rejection at large user sites in favor of other data input methods including ter-

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minals, timing of the new data station announcement for fourth quarter 1974 delivery seems opportune for IBM.

During the next two years, the total number of data entry keyboards in the U.S. is expected to grow from the 450,000 level to 540,000: Keypunches will hover at the 270,000 level (as the mix shifts from 4-to-3 unbuffered now to 3-to-2 buffered at yearend 1975, including 96-column devices). Key-to-tape units will decline, their numbers slightly more than replaced by shared processor stations.

But the major data entry growth will be in terminals and 3740-like devices. In the next two years, the number of these units is expected to almost double, to 170,000. This will represent a penetration from about 20% of U.S. data entry stations today to almost one-third at yearend 1975. It's a market IBM can't overlook.

There are other implications of this late-breaking announcement -- new thinking about host CPU control . . . possible competition with an impending System/2 as the "family" continues to grow . . . maybe even anti-antitrust implications. These will be discussed next week in a yearend wrapup issue. Peace.

GE'S NEW REMOTE DP SERVICE OFFERING PICKS UP ON FADING "FM" THEME AS CLASSIC FACILITIES MANAGEMENT COMPANIES SHIFT SERVICE OFFERINGS

Facilities management was back in the news this month with the announcement of General Electric's new "remote facilities management" service -- an offering described as a "logical extension" of GE's well-established timesharing and remote batch services. The announcement seemed to spark another flurry of stories in the financial press about the booming facilities management industry and its multi-billion dollar potential. And maybe the stories are true -- there's probably a big market for something that does what FM was supposed to do -- but EDP Industry Report thinks it's time to look for better names than FM for these new and basically different services.

With its "remote" facilities management, GE's Information Services Division is offering to transfer all of a customer's data processing activities to its Mark III network -- freeing the customer from his computers, operating staff, computing room overhead, and attendant headaches.

Via the network, the client can use as much or little computing power as he neds at a given time, eliminating the costly waste of unused capacity on his own machines. For an initial fee GE will convert his entire program library to run on the network's bank of 20 Honeywell computers centered in Cleveland -- and provide and service necessary card readers, remote printers, and interactive CRTs.

GE has been testing the idea with its own Switchgear Products Division in Philadelphia since April and claims the division is saving $200,000 a year from its former $1.8 million annual DP budget. The network took over Switchgear's entire inventory of 1,000 financial, engineering, and manufacturing programs -- while Switchgear replaced its Honeywell 635 with two high-speed card readers and seven remote printers. The network now processes nearly 15 million lines of printer output a month for Switchgear Products.

The network charges users only for the amount of time they use the terminals or central computers -- giving managers a chance to see exactly where their data processing dollars are going. GE says its itemized bills will give users a lot more control over costs.

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The idea sounds promising -- but is it facilities management? The question is worth asking, because facilities management -- as it was first conceived -- hasn't fulfilled the glowing predictions analysts were making a few years ago. And it doesn't seem likely to in the future, despite the enthusiasm FM still inspires in some onlookers. The success of GE's new service, EDP/IR suspects, will depend on how well it can exploit the basic differences between remote processing and classic facilities management.

Facilities management, in its classical sense, is the business of taking over and running a data processing operation on the client's premises. The customer, so the sales pitch goes, is freed from his DP problems by turning them over to an outside contractor, just as he might farm out his cafeteria or janitorial services. The vendor, for his part:

- Assumes the entire burden of hiring staff, paying for the hardware and running it on site.
- Promises to improve the customer's DP operation, perhaps by bringing in more experienced specialists or better computers, or by gradually rewriting the client's software.
- Seeks out new DP applications within the client's company.

The result of all this is supposed to be better operation at less cost -- and more extensive use of the client's computers. But all too often the only real outcome of a switch to FM is a change in the mechanics of payment while the same people go on running the same machines in the same way as before.

Rethinking the concept

The essential flaw in the classic FM concept is that data processing is an integral part of a user's operation -- unlike such tacked-on problems as feeding the employees or cleaning the halls. Though FM has proven to be an appropriate way to handle relatively standardized types of work in some fields -- such as banking, insurance and government accounting -- experience has also shown that expertise in computing is no substitute for an intimate knowledge of a company's operations when it comes to running the data processing department.

To put it another way, a programmer for an automated cookie factory has to know as much about cookies as he does about computers -- if not more. Increasingly aware of this, the heads of most large corporations surveyed by International Data Corp., EDP/IR's publisher, say they have no intention of turning their DP operations over to outsiders.

But GE may succeed where FM has failed -- because GE isn't selling supervision of the customer's system analysts and programmers. It's offering computing power in place of computers, leaving control of the programming staff with the user. By sticking to what it knows best -- running hardware -- GE is proposing a new division of labor that may well attract the large users it's going after. GE says its first customers will be "carefully selected" but isn't saying what sectors it's concentrating sales efforts on.

In any case, GE's emphasis on capturing the largest users points toward another shift from traditional FM -- which generally assumed that big firms could run their DP operations as well as any specialist.

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FM companies turning to packaged applications

Other types of services are evolving from facilities management to fill users' needs for outside help. Confusingly, many still cling to the FM label. But most of them are actually in the business of processing a limited set of applications for certain kinds of users. If those applications are the only ones the customer chooses to computerize, the vendor looks like a facilities manager. Generally though, these vendors differ from true FM companies because:

- The computer is housed outside the client firm and shared by other customers of the vendor.
- The general software is packaged, with only minor customizing to fit the unique needs of each client.
- The vendor explores new applications for the customer only when the resulting software can be packaged and sold to other clients as well.

The prime example of this trend is the giant Cybernet-SBC network operated by Control Data Corp., which recently merged its "systems" and "services" divisions into one operating company. Cybernet offers users a wide range of highly specialized technical and scientific software packages and a network of big number crunchers to run them on. SBC, taken over from IBM offers commercial and financial packages as well as remote computing.

In theory, a CDC customer could turn over all his applications to Cybernet-SBC and use the network as a computing utility in the same way GE proposes. But CDC -- which will earn well over $100 million from services this year -- aims its marketing toward special needs of various groups of users, following up the philosophy it used to get a foothold in the mainframe market with its supercomputers for vast scientific calculations.

CDC was never a big facilities management enthusiast, but it did organize a separate FM service a few years ago to serve hospitals and other subsectors. Now -- pursuing further its applications-oriented approach -- CDC has reorganized its FM accounts and classified them under other services within the same areas of application.

Will the real FM vendors please stand up?

What about the companies that still call themselves facilities managers? Some analysts add up the revenues of these firms from all sources and arrive at some rather astronomical estimates of the size of the FM market. But again, most of these companies aren't really selling true FM services in the commercial market and their revenues are included under other headings in IDC studies. Certainly there are gray areas of definition between true FM vendors and true computer service vendors, but there's a general shift toward the computer service end of the spectrum.

IDC omits from its analyses the spin-off firms with captive FM accounts -- Douglas Automation, Boeing Computer Services or Grumman Data Systems, for instance. The FM revenues of these companies are captured from their parent organizations, and their revenues from outside accounts should be classified as computer service business.

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"CLASSIC" FM COMPANIES ARE MOVING TOWARD SPECIAL SERVICES

ELECTRONIC DATA SYSTEMS CORP. (EDS), Dallas, TX. The company that made the first big splash in FM and still the biggest in the field by almost any definition. The brainchild of Ross Perot, EDS rode from rags to riches on the backs of a few huge FM accounts and attracted many other firms onto the overloaded bandwagon. But even EDS is following the trend toward computer services. It began by operating on-site machines for a variety of clients, dropped a solid anchor in some fields, lost headway in others, then started to centralize operations and develop software packages for clients with similar needs. Now it's developed an "industry center" approach. One of its three groups of processing centers handles Medicare/Medicaid forms for Blue Cross/Blue Shield, another handles insurance and a third serves brokerage firms -- a new Perot venture.

Perot invested heavily in the troubled brokerage house of DuPont Glore Forgan and arranged for EDS to take over its complex data processing problems. Capitalizing on his new expertise in that field, Perot has won at least one more brokerage account and hopes to make money helping the stock market wake up from its paperwork nightmares. EDS's total revenues were $91 million in fiscal 1972.

WYLY CORP., Dallas, TX. Formerly University Computing Corp., Wyly got into the FM market several years ago by acquiring Computer Technology Inc., formerly owned by LTV Aerospace -- and that's how names and companies change in Dallas, the FM capital of the world. Except for its work for its parent firm, CTI is concentrating on such fields as commercial banking and bank credit cards, life insurance and Medicare processing. But outside of its work for LTV, CTI's revenues from FM accounts are estimated at less than $10 million a year. Wyly makes no secret of its disappointment in its subsidiary's performance in its last annual report.

BRADFORD COMPUTER & SYSTEMS CORP., New York City. Started in FM and then, typically, made a hit with one customer and saw an easier road to profits by expanding a specialized service to similar clients. Bradford specializes in shareholder services for banks which serve as transfer agents for corporations, mutual funds services and portfolio record keeping. It continues to work as a facilities manager for industry, financial institutions and government agencies. Bradford's total revenues of $12.4 million in fiscal 1971 were probably split evenly between FM and specialized services.

NATIONAL SHAREDATA CORP., Dallas, TX. Operates internal DP centers for banks and provides automated customer services. Fiscal 1972 revenues were $8.2 million. National Sharedata merged with Western Union this year.

Working for the government

Also omitted are government Operation and Maintenance Contractors. Large federal contracts to run certain DP installations for the AEC, NASA and the military were the forerunners of commercial FM services and now bring in more than $50 million a year. But federal O&M contracts represent a relatively stable and ingrown market. The major O&M contractors, in order of estimated O&M revenues, are: Computer Sciences Corp., Service Technology (LTV), Computing and Software (Cordura Corp.), System Development Corp. and Informatics.

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FM and timesharing

At least 13 companies in a current directory of timesharing organizations list facilities management as part of their business, and each would likely provide another FM definition. What's more, the large computer service companies sell access to their networks both to other service companies and to industrial users. Again, the networking of a specific processing job for a client is not true FM, but fits into the mixed picture being discussed. Bunker Ramo, for instance, runs reservations networks for an airline and a hotel chain on computers dedicated to those clients; McDonnell Douglas operates the network for CARS.

Classic FM arrangements do exist, and are even commonplace in finance, banking, and insurance (see box, page 5). And even if FM vendors aren't offering the same services as the "hybrid" companies discussed here, they all sing a common theme -- get rid of DP headaches and cut costs by calling on independent specialists. But to lump them all under the FM umbrella doesn't explain much . . . and glosses over the many problems that may well render classic FM services obsolete.

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MEMOREX BRINGS EXTENSIVE SUIT AGAINST IBM AS EXPECTED;
PACKAGE OF COMPLAINTS EXCEEDS $3 BILLION WHEN TREBLED

The general industry reaction was "Wouldn't you?" after Memorex last Friday filed three complaints that totaled $1.05 billion -- before trebling -- in the U.S. District Court of Northern California (San Francisco). The complaints allege violations of Sections 1 and 2 of the Sherman Act (conspiracies in restraint of trade plus monopolization and attempted monopolization) in the entire EDP market, the peripheral market, the market for specific peripherals and disk packs. In four separate counts repeated again and again, Memorex goes Telex one step further in the most detailed indictment of IBM marketing practices since the CDC complaint started the legal attack on Fortress IBM just over five years ago:

- Virtually reciting practices established in Telex vs. IBM, Memorex charges IBM with selective price cuts -- offset by CPU price increases -- via the 2319A and 2319B, the fixed-term and extended-term plans.

- In great detail, Memorex charges IBM with threats and misrepresentations to customers, introduction of "phantom" equipment, use of "mid-life kickers," refusal to disclose arbitrary standards, conspiracy to depress stock market prices, and illegal use of copyright claims.

- In charges against World Trade Corp. and various IBM foreign subsidiaries, Memorex charges conspiracies.

- Finally, Memorex charges that IBM's non-payout leases establish a norm that competitors **must** match, and that since they don't bring full return on equipment sold they make financing difficult. In other words, Memorex charges that IBM uses its "redundant cash and cash equivalents" of nearly $2 billion as a monopolistic tool.

The suits -- by MRX Sales and Service Corp., ILC Peripherals Leasing Corp., and various Memorex subsidiaries abroad in addition to the parent -- will probably be consolidated; the foreign claims may be severed as in the Telex case. IBM's reply isn't expected until February, and a decision before late 1975 would be unlikely. Meanwhile, as the table on page 7 indicates, suits that in total are as large as the Telex and Memorex suits combined can well be expected.

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HOW MUCH MIGHT MEMOREX WIN . . . IF IT WINS?

In deciding the original amount of damages in the Telex vs. IBM suit . . . in considering how to allocate the offset for trade secret theft . . . and in determining the final amount of damages, Judge A. Sherman Christensen was continually vague in explaining exactly how he ascertained the actual impact of IBM's "predatory" pricing practices (EDP/IR Sept.24, Oct.31, and Nov.20,1973). The best breakdown he provided was the first, before offsetting the effect of the trade secret theft he found Telex guilty of. Relief was as follows:

Lost profits from deprivation of market share	$ 70.0 million
Lost rentals on shipments prior to 4/1/72	20.0
Lost rentals on reasonable shipments after 3/72 . . .	19.0
Lost sales profits to specified accounts.	8.5
TOTAL	$117.5 million

No exact breakdown by product type was presented (and the final figure was set off $31 million), but at least the nature of the Judge's thinking is reflected above. In the findings of fact, however, most of IBM's predatory acts seem to focus around disk drives . . . the 2314/2319 in particular. There is certainly no question that most of the dollars evolve around this third-generation "family" of disk storage drives. So for purposes of speculation as to the final outcome in the current case, EDP/IR presents the following facts derived from the evidence in Telex vs. IBM and collected from PCM manufacturers. Installed base at yearend 1972 is calculated at IBM list prices (in $ millions):

	Tape				Disk				Grand
	240X	2420	3420	Total	2311	2314	3330	Total	TOTAL
Base (Court count)	$ 75	$ 51	$ 54	$ 180	$ 54	$361	$ 4	$ 419	$ 599
IDC "Census"									
Telex Base	$ 31	$ 16	$ 26	$ 73	$ 5	$102	$ 7	$ 114	$ 187
Memorex Base	0	0	0	0	$ 24	$190	$ 2	$ 216	$ 216
Total PCM Base	$115	$ 32	$111	$ 258	$ 59	$508	$ 18	$ 585	$ 843
% Share (IDC count)									
Telex	27%	50%	23%	28%	9%	20%	37%	19%	22%
Memorex	0	0	0	0	40%	37%	13%	37%	26%

What does all this prove? First, forget the details. Forget the unanswered discrepancy between "Court" figures and those supplied to IDC by the manufacturers themselves (EDP/IR Nov.20,1973). Look at the ratios. Try a few different assumptions. If Telex damages were based primarily on 2314-type activity, then Memorex could possibly be awarded just about twice what Telex got (37% vs 20%) -- $217.4 million by the calculator, forgetting any possible effects from Memorex accusations about IBM threats and misrepresentations to customers. Or, if damages were calculated on the total PCM market, then Memorex stands to fare only slightly better than Telex -- $138.9 million. No matter what assumptions are made, it would appear that Judge Christensen would award Memorex as much or more than he found for Telex before he deducted the effect of theft. What will a different judge -- or a jury -- do? What about the additional charges? Are there offsetting factors in this case? EDP/IR doesn't want to sound like a "soap opera" announcer, but it emphasizes there are no hard and fast rules for situations like this!

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• A REMOTE PROCESSING SYSTEM that essentially extends an IBM/360 or 370's channel out over telephone lines was the topic of a seminar earlier this month at the Data Processing Suppliers Association meeting in New York. The Multitran 4000 from Computer Transmission Corp. allows card readers, printers, terminals and tape drives to operate from remote sites with no telecommunications considerations. Based on a Honeywell 316 minicomputer, the Tran M4000 consists of a channel extension unit and one or more remote device interface units. And with a pair of units -- priced at $53,000 for the two -- plus a teletype console, users can eliminate remote CPUs in many applications.

A Time, Inc. spokesman told the seminar his company uses an M4000 to link a 370/155 in Chicago to five high and low speed I/O devices in New York, eliminating a proposed second computer. "The Multitran 4000 gives the illusion that you are actually dealing with the host computer," said Time's DP director. "It extends the multiplexor channel almost indefinitely." A Trans spokesman said the system allows almost any kind or make of peripheral to be installed at a remote site. Typical M4000 configurations will be priced under $100,000.

In data distribution networks, the channel extension unit is plugged directly into the host computer -- and communicates by telephone lines to the remote device interface unit. Since the computer thinks the peripheral is in the same room, no teleprocessing software is needed to distinguish between remote and local devices. In most applications, Trans says, this also eliminates programs to handle polling, queuing and querying of remote devices.

• HONEYWELL WILL INCREASE PRICES 2% on its computer products and services, the second-ranking computer manufacturer announced this week. The announcement came just two weeks after IBM's 2% price hike -- but Honeywell's will go into effect January 1 while IBM is holding off until March. Like IBM, Honeywell blamed the increase on higher costs and inflation. The new rates will apply to monthly rental charges on all CPUs and peripherals, purchase prices of the Series 6000 central systems and Model 58 equipment. Certain maintenance and services prices will also be affected.

• CALIFORNIA COMPUTER PRODUCTS DENIES having stolen any trade secrets from IBM, as the Giant charged in a countersuit after CalComp sued IBM for anti-trust damages. CalComp President Lester Kilpatrick told stockholders that the independent peripheral manufacturer has never spied or hired any development engineers away from IBM. Kilpatrick did not deny that CalComp uses designs on which IBM claims patent rights, but pointed out that many such patents have been ruled invalid after litigation. The job of trying to have all IBM's thousands of patents ruled invalid would be "monumental," he told investors. And IBM, he claimed, refuses to license CalComp to use the disputed patents on a "reasonable" basis. Kilpatrick called IBM's third accusation -- that CalComp unfairly monopolized the market for digital plotters -- "flattering ... but ridiculous."

• IBM HAS THE BIGGEST UK MARKET SHARE of any computer manufacturer, surpassing even Britain's own International Computers Ltd., according to the Department of Trade and Industry. IBM held 38.4% of the UK market at yearend 1972, somewhat more than ICL's 34.7%. The average value of IBM systems are also higher -- $675,000 vs. $500,000 for ICL units. The UK report noted that government support for the domestic computer industry lags far behind the large sums invested by the French and German governments.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 31,1973 • VOL.9,NO.6 P.J.McGOVERN,EDITOR

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Some answers about 1974 . . . some questions -- page 5

PRELIMINARY FIGURES SHOW COMPUTER SHIPMENTS UP 13% TO $9.6 BILLION; BUT WIDESPREAD CLOUDS OF 1974 DOUBT MAY HAVE A SILVER LINING

When 1974 is wrapped up nice and neat for the history books . . . and students of such things have their chance to examine and disect in the luxury of an ivory tower . . . it still may be one of the most interesting years since 1929 or 1939. As the year begins, however . . . especially as EDP Industry Report looks ahead through and for the eyes of the computer industry . . . there are probably more known uncertainties than the computer industry has ever seen in its short but impressive trajectory toward importance in the economic shape of things.

So for some time, now -- since the so-called "Energy Crisis" has forced even the most casual observer to become at least a little bit aware of macro economic forces -- EDP/IR has focused particular attention on THE STATE OF THINGS. We have carefully attempted to measure the health of the information processing industry; we continue to find the prognosis GOOD. Not excellent, but good.

- First off, 1973 will stack up as quite an acceptable year for most companies in the computer industry. Shipments by U.S.-based manufacturers are expected to add to $9.6 billion, with "new builds" of general-purpose equipment up 11%, minicomputer production up more than 50% to the $760 million level worldwide (pages 4 and 5).

- With mainframes already loaded to capacity after the "belt tightening" of the 1970-1971 recession . . . with increased pressures for improved sensitivity to business level changes . . . with more than a small number of computer expenditures that can lead to major reductions in energy consumption . . . spending can continue.

- Order books, as best they can be estimated, are nearly as full as they ever have been. Users, in the midst of consolidation and centralization plans that include new telecommunications equipment, continue to report plans for spending a modest 8% to 10% more in 1974.

Indeed, the recession being anticipated on some fronts is like no other in the history of American business. It is not triggered by "natural" economic forces . . . cannot be blamed on reduced government expenditures or restricted monetary

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policies. There is an external culprit -- energy -- and because of this managements can reduce expenses to match lower demand. A recession in which profits may not decline -- but in many cases, in fact, have the prospect for advancing -- is certainly one for the history books! It isn't often that management can institute lay-offs without stirring up labor unrest.

Furthermore, if a recession is on the way -- and that's not at all certain -- ammunition will certainly be stockpiled for what is clearly the most significant philosophic dispute about computer industry economics: What are the real relationships between general economic conditions and the position in time along the undulating product cycle/generation curve the computer industry follows? The answer may well be academic, of course, since no more than one more major cycle is really anticipated by any industry pundits. But it will at least be another subject for a few dozen dissertations.

The negative side of things

All is not "peaches and cream," however; and EDP/IR recognizes its propensity to emphasize the positive. (We have charted IDC's current shipment forecasts -- page 3 -- on a linear scale to point up the "bubble" of the late 1960s as well as the relationship between U.S. and International shipments.) There are also some unknowns that could temper the outlook:

- If a recession occurs, it could hit the whole industrial world simultaneously and thus prevent the "rolling" offset as one country or area of the world prospers while another battens down the hatches.

- Inflation and high interest rates could easily return to those areas -- Japan and to some extent Europe -- hardest hit by oil and energy shortages. This could reduce the capital available for computer or any other kind of expansion; what it might do to the long term picture is uncertain.

- Computer retirements will be 40% of shipments in the U.S. (high, but a far cry from last year's 70% domestic rate) and 30%-to-35% in other parts of the world. Users want to consolidate and/or take advantage of more productive technology. An extreme capital pinch, of course, would cut the level of both shipments and retirements.

All in all, the biggest potential danger is fear itself; but in the U.S., at least, the widespread reaction seems quite Rooseveltian. Manufacturers seem to think they have adequate sources of supply for the short haul . . . and there is talk of using more computers to polish up the "economics of scarcity." Users, for their part, don't exhibit undue anxiety. One of the major concerns is paper, and as often as not this leads to talk of heavier reliance on COM or displays.

The basic fact -- at least as it comes through to IDC in its continual monitoring of the user marketplace -- is that many large using organizations are well along in the implementation of larger and more useful computer systems. The expenditures already made in resystematization promise savings much larger than the delay of equipment delivery for a few months. The systems currently being implemented have been in the works literally for years.

So there will be mounting pressure to continue -- to bite the bullet, if that's what it takes. Users made the plans they are now working under during a

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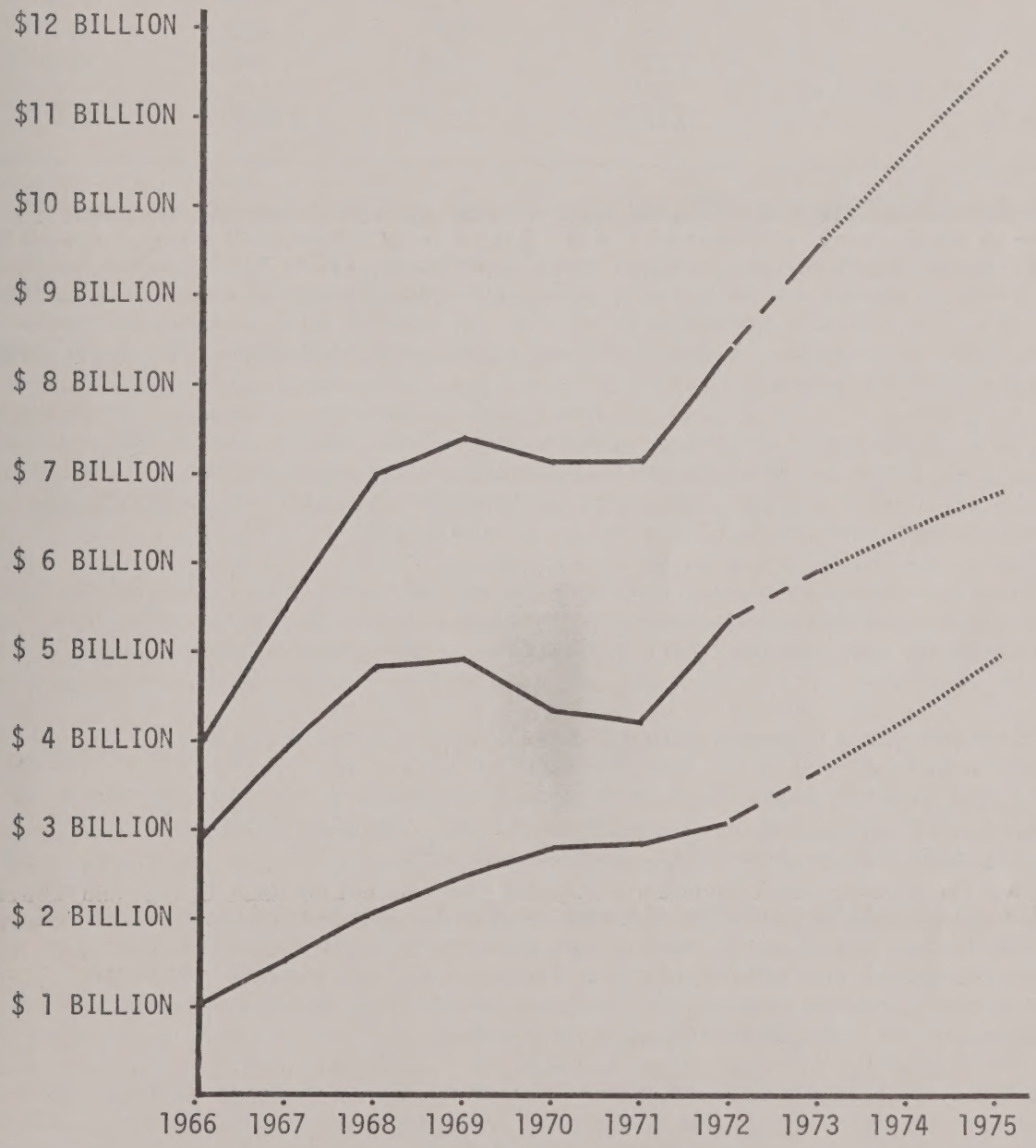
real recession -- 1970 or 1971 -- as they looked at new equipment specs, planned, and filled up the excess capacity of the equipment then installed. The big valley in the U.S. (middle) curve below illustrates the effect this had on shipments of new equipment. Now, they continue to report, is the time for progress. In a very real sense, the true value of computers to management has been seen, and a large number of users plan to take advantage; "minor" additional equipment expenditures are even more important if another crisis period lies ahead.

COMPUTER SHIPMENTS BY U.S.-BASED MANUFACTURERS
International, lowest line; U.S.; and Worldwide, top line, in $ Billions
(Copyright 1973, International Data Corporation)



STEADILY INCREASING COMPUTER SHIPMENTS are forecast by IDC as users continue to shift toward communications-oriented hardware, larger memories and processors. Users surveyed after the on-set of the "Energy Crisis" continue to say spending will increase. Short-lived economic fluctuations don't offset planned new uses

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WORLDWIDE SHIPMENTS OF COMPUTERS BY U.S.-BASED MANUFACTURERS
Preliminary Estimates in $ Millions; Copyright 1973 by International Data Corp.

	1972	% Δ	1973	% Share
IBM	$5500	7.8	$5925	61.7
Plug Compatibles	345	67.3	575	6.0
HIS	750	1.6	760	7.9
Univac	480	14.9	555	5.8
Burroughs	$ 390	16.9	$ 455	4.7
NCR	220	22.7	270	2.8
DEC	185	45.1	265	2.8
CDC	235	3.4	245	2.5
Others (including minis)	370	49.3	555	5.8
TOTALS	$8475	13.3	$9605	100.0

Momentum for venturing into the unknown

The broken lines on the graph (page 3) indicate IDC's preliminary estimates for new-built computer shipments, by U.S.-based manufacturers, during the year now ending. The overall growth rate of 13% -- coupled with lower retirement levels than 1972 -- is good. A few detailed highlights shed even more light onto the picture as 1974 begins:

+ IBM's 8% shipment growth to almost $6 billion didn't nearly keep pace with the other mainframers, which collectively had an 18% increase. DEC's 45% growth moved it into the "majors" -- ahead of CDC and almost even with NCR in value of equipment shipped.

+ The plug-compatible manufacturers -- perhaps spurred by the Telex victory over IBM -- shipped over half a billion dollars worth of equipment and "stole" three percentage growth points from IBM in the process.

+ Minicomputer shipments (across page) were up more than 50% to exceed three-quarters of a billion dollars in 1973. As IBM (with its System/7) and General Automation each more than doubled its 1972 shipment level, DEC held its 30+% market share and sustained the growth of this industry segment with its 50% increase.

+ CDC (apparently shifting its emphasis into the service business) and HIS (doing brilliantly with large processors but suffering from its waning small and medium product lines) both had minimal worldwide shipment growth. Actually, each of the companies shipped less equipment in the U.S. than they did in 1973.

But Honeywell apparently is about to remedy its product position -- first with a souped-up version of the successful 6000 line early in 1974 . . . then, in the spring, with one or two models from its New Product Line. These are expected to be in the 370/135 and/or 370/145 class. NCR seems to be supporting its small computer line -- and working with CDC on a larger machine for the late 1970s -- to protect its position in the autotransaction business. All in all, the mainframers seem to be in good position as 1974 opens.

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DEDICATED APPLICATION AND MINICOMPUTER SHIPMENTS BY U.S.-BASED MANUFACTURERS
Preliminary Estimates in $ Millions; Copyright 1973 by International Data Corp.

	1972	% Δ	1973	% Share
DEC	$158	50	$237	31
IBM (S/7)	43	109	90	12
Hewlett Packard	54	54	83	11
Data General	35	71	60	8
HIS	$ 60	-15	$ 51	7
General Automation	22	107	45	6
Varian	23	35	31	4
Others	106	53	162	21
TOTALS	$501	51	$759	100

Burroughs continues to do its own thing . . . keeping customers happy and growing faster than the industry average. Rumor has it, in fact, that certain features on the small B700 caused IBM at least to re-examine the product it is expected to announce as the System/2 early in 1974.

This machine -- expected to rent in the $800/month range, have a nine-bit word for use in an SDLC communications environment (EDP/IR Aug.23,1973), and be able to support several terminals -- could really open an even lower-level marketplace for computers. Also, there is at least one school of thought that has the System/2 competing in some markets directly with IBM's new 3740 programmable work station introduced recently (EDP/IR Dec.20,1973).

Such a move isn't like IBM. Usually, when there are competitive solutions to a similar problem, strengths and weaknesses are argued in the halls of White Plains, and one is selected. If, however, the giant mainframer were planning some sort of voluntary divestiture . . . well, it would look good to have competing products at the low end of the line, wouldn't it?

What's coming up for the computer industry, Energy Crisis or no?

Two years ago -- as the computer industry seemed to be recovering from the recession/model-change doldrums during which users worked through the excess capacity from late-1960s oversell -- EDP/IR posed a series of questions based on the dialog maintained by the International Data Corporation, our publisher, with security analysts, economists, and corporate executives. The response was encouraging, so similar plans for reflectivity were made for this issue.

With the development of an "Energy Crisis" -- and talk of possible recession -- many questions posed to EDP/IR revolved around that subject . . . and the macro economic overtones of "Future Shock" or "Limits to Growth" it includes. There are no hard and fast answers for such intriguing subjects; we hope our basic ideas at the beginning of this issue are helpful.

In thinking over 1973 and THE STATE OF THINGS in and around the computer industry, however, it seems to EDP/IR that many of the more customary details seem to fade away at this point in time. Two significant, over-riding answers immediately suggest questions of utmost importance:

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A: THE COURTS *Q: Who is going to determine the nature of the computer industry in the 1980s, and very likely influence the path it follows in getting there from here?*

A: THE FCC *Q: Who is going to decide, ultimately, how much freedom of choice the user has in implementing his computer system?*

Before taking a look at the legal situation -- which has been covered with great consistency by EDP/IR, reported and editorialized on by much of the trade and business press ever since CDC brought its suit in late 1968 -- let's look at the second thought above. Put another way, *data base management in a communications environment is the key to sophisticated and therefore profitable utilization of computers available today.* It is not the only answer -- especially not today, when clever batch-oriented operators can still perform "miracles" -- but it is the real watershed of modern-day computer use. And data communications is a must.

And today, after years of footdragging by the telecommunications industry, data communications suddenly seems ready to "bust out all over." The FCC's hope -- expressed in 1971 when it decided that specialized common carriers might bring competition, new technology, and better service to communications -- seems to be on its way to fulfillment. During the past 12 months:

- Datran began service on the first link of its all-digital data transmission network -- and went to COURT to try and stop Ma Bell from offering digital data service among 26 major cities in 1974. Canada introduced its own data transmission facilities; Western Union proposed an overseas digital network.

- The specialized common carriers such as MCI and Southern Pacific accelerated the trend toward consolidation even as their private line microwave networks were still abuilding. The SCCs are bringing lower rates to many high density routes and, perhaps more importantly, are prodding Bell into competitive rate restructuring.

- Packet Communications Inc. won FCC approval to develop the first packet switching network . . . and the FCC said it will encourage other "value added" services to market specialized data services.

- The first domestic communications satellites -- offering broad bandwidth channels capable of handling huge amounts of transmitted data -- were readied for service early in 1974.

As a result of the above, a free-for-all in telecommunications is beginning. It will eventually mean cheaper and far more reliable data communications, but the frenzied infighting on the regulatory and competitive fronts that brought much of this progress about may also result in delays until the COURTS decide who may do what. Until then -- and even then in many areas of the country -- the user will be locked to one communications supplier, one scheduler of progress.

And what of the equipment? the computers to communicate with?

The hassles as well as the progress promised in data communications stem from one small and now-defunct equipment supplier tackling the largest corporation in the world, and a legal monopoly to boot. What of the situation in the computer industry where the "score" is now won-a-few/lost-one-but-wait? Where

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the "opponent," although large and dominant, got there pretty much on its own devices? What about IBM?

The situation is quite involved . . . but relatively easy to summarize. During the last five years,

- a mainframer brought a broad, sweeping suit against IBM, then finally decided to settle for what looks like an excellent position in services.

- one leasing company sued and settled; another sued and lost; others are now jumping in, because . . .

- an independent peripheral manufacturer sued and won the first round.

- the United States Department of Justice, almost five years ago, filed antitrust charges against the International Business Machines Corp. The trial is scheduled for next fall.

This is the main event. Other peripheral companies have or probably will file suits similar to the one won by Telex. Other types of companies are being encouraged to do the same. The mainframers, interestingly enough, have asked for guarantees of a "status quo" until Justice finally has its day -- or year -- in court. In addition to seeking damages, many of IBM's "suitors" suggest or demand that the Giant be broken up.

How do you break IBM up without destroying the computer industry?

The easiest way to start a conversation with anyone who even thinks he knows something about computers or the computer industry is to ask THE QUESTION, posed above. EDP/IR doesn't know the answer . . . hasn't heard one that holds water.

At the National Computer Conference last summer, the Computer Industry Association -- a non-profit organization of computer manufacturers and users often identified as "IBM getters" -- discussed the situation at a press luncheon. The "summary and conclusions" presented there are certainly true: +) important changes are coming; +) there is no clear cut solution; +) it involves the future U.S. policy toward corporate bigness; +) it involves conflicts between powerful forces: Executive vs. Legislative vs. Judicial/Wall Street vs. Institutional Portfolios/ IBM vs. The Rest of the Industry/ Computer Users vs. Suppliers.

These sound like questions for THE COURTS. Also, after reading and thinking about the IBM Management and Management Review Committee "minutes" introduced into evidence in the Telex case, EDP/IR begins to think these sound like questions for IBM to answer. It answers big questions.

It won't happen tomorrow?

Just as we think 1974 may be the year in which computer communications seem certain to see radical improvement and less regulatory intervention . . . we begin to wonder if it could also be the year in which -- somehow -- all the legal entanglement begins to disappear from the information processing industry. Maybe, somehow, IBM could figure out a way to preserve justice, protect stockholders, prevent its "bank" from being siphoned away . . . and above all permit computer users -- soon, almost everyone -- to take maximum advantage of what is without doubt one of mankind's most powerful inventions? -- *James Peacock*

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• DEVELOPMENT OF THE FIRST INTERNATIONAL digital communication service specifically for data transmission was proposed this month by Western Union International. WUI wants to set up a dual-path digital network to operate over the same international routes it now serves with analog channels. So far, however, this is strictly a "proposal" -- because overseas digital transmission won't be of much use to foreign customers until telephone officials in their countries agree to furnish similar land-based services for interconnection. In the U.S. -- one of the few countries where communications facilities are privately owned -- AT&T only recently has announced the availability of all-digital transmission;, most of the other 150 nations served by WUI's undersea cables and satellite channels lag much further behind.

WUI believes the time is ripe both for computer-tailored communications overseas and a restructuring of rates to make such services more economical for users. Knowing this, the international carrier -- formerly the international subsidiary of Western Union Telegraph Co., but now independent -- plans a world-wide conference of telecommunications officials in New York City this February to air its proposal and find out how many of its overseas partners are willing to go along -- and on what terms.

Designed to overcome the reliability problems that plague overseas data transmission over voice-grade channels, WUI's proposed system would use simultaneous transmission paths -- via both cable and satellite -- to provide automatic backup in case of line failure or fading. Backup central office equipment and time division multiplexing would, WUI claims, acheive an error rate on the order of one bit per 10 million. The company says initial foreign reaction is "encouraging" -- but won't predict when service might begin.

• WHO MIGHT USE WUI'S OVERSEAS SERVICE? Bache & Co., the nation's second largest brokerage firm, is an example of one type of possible customer. Bache recently signed a seven year, $12 million contract with GTE Information Systems to develop a high-speed international data communications system to handle securities and commodities information. The customized network will cover offices and exchanges in 11 countries, providing automated order entry and reporting through 1,500 remote printers, brokerage terminals and CRT devices.

• MAGNETIC BUBBLE MEMORIES ARE OUT OF THE LABORATORY at GTE and ready for testing in a practical application. GTE Laboratories has turned over a prototype bubble memory to GTE Automatic Electric -- GTE's manufacturing subsidiary -- for evaluation in an electronic telephone switching system. Spokesmen said early price/capacity estimates for GTE's device indicate it will be able to provide secondary storage units priced in the same range as tape and disk drives but with a thousandfold greater capacity.

• IBM IS SELLING ENERGY CONSERVATION with a new Energy Management System that gives power companies more effective control over widely dispersed power generation and transmission networks, IBM claims. Based on a virtual storage System/370 linked to 3707 data acquisition and control stations through System/7s, the full scale version of the system can monitor varying loads and malfunctions within electric networks and format data for immediate action by dispatchers. IBM says the system helps utilities maximize use of their most efficient generators and transmission routes, cut fuel waste, and offer more reliable service. The modular system can be operated regionally with a stand-alone System/7.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 16,1974 • VOL.9,NO.7 P.J.McGOVERN,PUBLISHER

Software to dictate hardware

EARLY PLANS INDICATE THAT "Q," IBM'S NEXT OPERATING SYSTEM, WILL EMPHASIZE NON-PROGRAMMER USE, LAST FOR AT LEAST 10 YEARS

After more than a decade of operating system development -- leading to a proliferation of different systems for large and small computers, multiprocessing, virtual storage, and scientific problems -- IBM seems preparing to introduce a new universal operating system that's designed to meet "all" functional requirements for at least the next ten years. Called System Q in the Telex trial documents, the new system will obsolete all previous IBM operating systems (but run programs written for them) and be the basic software for IBM's "Future Systems" slated for announcement in 1976 or so.

No one outside of IBM knows exactly what System Q will look like -- latest date on the documents was 1971, when development was still in early stages -- but indications are that announcement could come as early as this year, since it appears that software will determine many FS hardware considerations. Despite their sketchiness, trial documents give a fascinating glimpse through IBM's eyes into the future. And recent hints reinforce EDP/IR's opinion that the Giant has made no major changes in direction since plans were outlined in 1970.

The documents set out some broad goals for System Q design:

- The system must be usable -- by the man-on-the-street as well as the professional programmer. Broader usability is the dominant theme of IBM's software planning for the next decade. (See box page 3.)

- The system must be available -- reliably and continously -- with built-in resistance to failure in critical applications.

- The system should be "opaque" to the casual user. In other words, the user should have no way of knowing how or where the system is handling his data. IBM thinks this is crucial to "divorcing the concepts of data and storage" and encouraging network development.

- The system must be "functionally viable at the low end." The smallest operable edition of Q will determine the design of the smallest member of the FS family. IBM market analysts targeted the rental of this low end system at about $5,500 per month.

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- The system must offer an easy path of migration from present generation systems.

Accomplishing all these aims in a unified system designed to include and extend all the functions of present operating systems -- and at a much higher return on investment than IBM currently gleans from its programming efforts -- singles out System Q as the most ambitious software project ever undertaken.

As a first step toward shaping the project into manageable form, IBM defined Q as an "architecture" of mutually compatible subsystems including elements of both hardware and software. As the word "subsystems" suggests, Q will be modular, allowing various functions to be plugged into the overall architecture through rigidly defined interface specifications. This characteristic of Q design serves several ends:

- Modules can be developed by specialized teams working independently in different parts of the world.
- Users will be able to buy configurations of Q tailored to their needs.
- New functions can be designed and added as future needs dictate -- without demanding a whole new generation of software.

In calling Q a system architecture, IBM seems to have adopted a fundamentally new approach -- a giant step toward user-oriented system design. Among other mainframers, this approach has been used most notably by Burroughs, especially in designing the small-scale B 700 and B 1700s introduced earlier in the 1970s.

From now on, the IBM documents shout out, hardware design will be just one component in a larger, pre-determined system concept; machinery will take shape on the drawing boards only after basic system software has been structured with the needs of the marketplace in mind. One result of this approach will be IBM's change -- with the introduction of FS -- from device-oriented collections of hardware to the price-oriented package, with proper hardware selected more on the basis of the application. FS systems, it appears from the documents, will be classified according to rental and use categories rather than by CPU type or main memory size, for instance.

VS is interim to Q

The discovery documents emphasize that System Q will be far too large to reside entirely in main memory -- and thus will require relocate hardware (virtual storage) as a "fundamental characteristic." This principle assumes, of course, that the current practice of combining main memory with on-line auxiliary storage will remain the most efficient way to run a computer, despite steadily dropping main memory costs. But that bet seems safe -- auxiliary memory costs have been falling fast too -- and the advent of non-mechanical magnetic domain memories is expected to increase the price/performance of auxiliary storage devices by a factor of 1,000 or more.

Thus it turns out that VS as implemented in the 370 family leads to the solution of the operating system problem IBM failed to solve in the 360 generation. In the early 1960s IBM hoped to develop a "single hardware and software system to span the entire product line." It succeeded on the hardware side with the 360 family -- but the art of programming hadn't reached the stage whereby a sin-

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USABILITY: THE THEMESONG IN SOFTWARE

We have to educate computers, not users -- Dr. Ralph Gormory, Vice President and Director of Research, IBM.

Thus in a single brief sentence, Dr. Gormory -- at a seminar in Yorktown Heights last fall -- summed up the central thrust of IBM's software philosophy for the foreseeable future. He emphasized that the sheer dimwittedness of computers is one of the main reasons why their perfect memories and enormous capacities for work aren't being more widely exploited.

Even professional programmers often find them hard to communicate with -- and the shortage of good programmers is growing worse every year. (In the Telex discovery documents, IBM analysts carefully note that the supply of programmers is expected to fall 100,000 short of demand in 1974.)

IBM is convinced that easier programming is essential to keep the market expanding. Programmers must become more productive and computing power must become accessible and useful on a routine basis to just about anybody who can read and write. System Q planners concluded:

> *The system must be usable. This simple statement of intent will have the most profound effect upon the entire system. Every other requirement for System Q will be subordinate to this requirement. Every function and feature proposed for Q must be evaluated in this regard to assure the system will not become surrounded by the jargon that characterizes the human interfaces today. The system must be usable by people who are not programmers, not professionals, not college graduates or even high school graduates. It must consider usability to be a feature that is at least as important as performance.*

What does IBM mean by "usable?" A current example is an experimental project IBM has been carrying out within the San Jose, CA police department. IBM supplied the department with a package designed to analyze mapped geographical areas in various ways -- police sergeants, for example, use it to calculate the balance between work loads and walking distances in assigning beats to foot patrolmen. And this is what IBM wants to see -- non-programmers taking advantage of highly sophisticated techniques to solve the increasingly complex problems they meet in everyday life.

Among the specific programming goals IBM is actively pursuing are:

- A layman's language for computer users.
- A "Common Command Language" for easy control of System Q functions and hardware at both large and small installations.
- Interactive programming techniques by which a non-professional user could write programs in response to questions from the computer.
- Input and filing of data directly from human speech, graphics, sketches and diagrams.
- Elimination of the need to use lower level languages for new functions.

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gle operating system could be designed small enough to fit in the smallest 360 memories, yet offer the sophistication larger users were demanding.

The result: IBM customers are using half a dozen different operating systems. This proliferation in itself causes problems; furthermore, the variants of OS, DOS and TSS available in 1971 were condemned as "functionally deficient" by IBM analysts in the most rapidly growing applications -- interactive, data base/data communications and sensor based. They noted that the failings of OS/360 in these areas had retarded the development of such applications in the marketplace.

With System Q, the Giant is undoubtedly determined to pick up a state-of-the-art lead in communications, data base management, interactive computing and "event-driven" processing by sensor based mainframes. Full scale Q installations will support all these activities -- as well as batch -- simultaneously.

The strong trends from batch to interactive and from local to remote computing were clear to IBM market analysts by 1970 -- and they spotted remote applications as the strongest growth sector for the coming decade. At the same time they realized that on-site batch processing would remain the dominant mode for quite a few years, meaning that System Q would have to offer complete support for all types of processing. The documents give no hint that IBM was giving any thought to the concept of distributed intelligence -- which suggests that IBM systems will continue to be centered around large mainframes or large central memories shared by multiple on-site processors.

From emulation to "coexistence"

A lesson from history seems to emerge from between the lines of early Q documents. As the 1960s waned, IBM began to find users becoming more and more resistant to upgrading their software as new releases of OS/360 appeared, or salesmen tried to move them from DOS to OS. Customers were learning about the problems of conversion -- and their businesses were becoming so dependent upon computers that even brief interruptions wrought havoc.

To cut "cost and aggravation" to users, IBM decided that System Q would have to run programs written for older operating systems with essentially no changes. Accordingly, Q will incorporate emulators to run 360 software, while VS programs will be able to "coexist" with System Q applications. That means old programs will run not only without change but concurrently with System Q programs on future IBM hardware. Sounds like a job for an expert in microprogramming ...

Roping them in with RAS

RAS -- IBM's longstanding acronym for reliability-availability-serviceability -- crops up again and again among the other bywords in the discovery documents. "The inevitable consequence of a system such as Q is that people come to expect it to be there at all times in fully operational condition, much like the telephone or television," the IBMers noted.

Obviously this dependency cuts two ways -- while it may put a greater burden on the manufacturer, it also tends to make his products and services indispensible to the economy. In any event, IBM is going all out for RAS in interactive and sensor based applications in its efforts to win over doubtful users. Automating emergency procedures seems to be the key strategy against RAS problems -- auto-

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matic regeneration of damaged data bases . . . automatic backup and restart . . . independence of functions provided by Q's modular design . . . remote diagnosis and debugging, for example.

An even stronger foothold . . .

As noted above, System Q is designed to stay around a long time. It isn't outside the realm of possibility, in fact, to speculate that -- assuming the IBM decision for all future software to be compatible in some way with previous systems -- Q will always be with us. The basic characteristics of Q's interface architecture could remain a standard systems design framework for decades to come.

The reason for this goes beyond the sheer momentum of IBM's vast investment in current and planned systems. As computers take over more and more of the complicated activities required to keep the social clockwork in motion -- minute by minute, year in and year out -- users will become even more sensitive to the disruptions that conversion and sudden change imply.

As IBM's planners have pointed out (see above), the entire industrial economy is becoming dependent on the uninterrupted availability of computing power. And if Q can insure availability, users will continue crawling further out the limb of computer dependency -- meaning, to an increasing extent, dependency on IBM.

This sounds like a corporate manager's daydream. But to the U.S. Justice Department, competitors, and groups such as the Computer Industry Association, the Giant's steady consolidation of power is deeply -- and understandably -- alarming. This should be, if it isn't, an important part of the plan.

EDP/IR doesn't take too many positions. But its editors strongly believe that any efforts to de-centralize this power will have to be thorough and far-seeing; at least the comprehensiveness of the System Q plans in the Telex documents demonstrate this. Unless future antitrust settlements, a consent decree, or even the Courts take better account of long-range developments than has been the case in the past -- i.e., the 1956 Consent Decree had little effect on IBM's upcoming moves into the computer industry -- the delays of litigation may leave prosecutors trailing in the major mainframer's wake.

It may be almost too late already. A decision in the Justice Department's long-pending antitrust suit probably can't be finalized much before 1980 is upon us and FS -- whatever the system is called -- is in wide-spread use. By then, IBM may be so deeply entrenched in the workings of the world economy that measures to unseat it will be to little avail. -- *Thomas Geyer*

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Overtones of divestiture?

IBM REORGANIZATION UPGRADES GSD AND REMOVES A LAYER OF MANAGEMENT

> *These marketing and service changes are designed to bring decision-making closer to the operating level. By making IBM more responsive, we will improve our ability to serve our customers.*

That's how Frank T. Cary, IBM chairman, described the terse announcement last week that IBM was replacing 19 districts and 3 regions with 14 new regions, establishing 14 Field Engineering regions to succeed existing area and regional offices, and giving the General Systems Division its own marketing and service force. Pre-

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viously, GSD was responsible for development and manufacturing of System/3, System/7, and "related equipment."

Details in the announcement were sparse. IBM did point out that World Trade Corp. "will establish a General Systems Division in a number of countries to market and service GSD products." Some industry sources, picking up on Cary's statement, have pointed out that the move could make IBM more competitive in the marketplace for small, first-time users. There are strong industry rumors that IBM is on the verge of announcing a System/2.

The real significance of the announcements, it seems to EDP/IR, involves two factors, possibly interrelated:

- Removing one layer of management -- which is effectively what the "re-regioning" amounts to -- and "promoting" Field Engineering to higher status both look like attempts to streamline management and keep the $11-billion company operating as tightly as possible. This also might improve customer service, just as Cary points out.

- Creating GSD into what now is a self-sufficient company -- with development, manufacturing, marketing, and service operations -- could also be a step toward some type of voluntary divestiture plan through which IBM might make the best of its worsening antitrust situation.

David E. Ferguson, publisher of System/3 World, agreed with the second point above. "It could be the prelude to a more formal separation," he says. And such a move by IBM would be no small matter. If just the U.S. portion of GSD were set up as a separate company, it would presently have revenues of $450 million, some 10% of IBM's U.S. computer operations. That would rank GSD alongside Control Data and behind only HIS, Univac, and Burroughs in the lineup of mainframers. That's food for thought in any analysis of the computer industry.

UNIDATA INTRODUCES NEW SYSTEM ONLY SIX MONTHS AFTER ITS FORMATION

Many observers were skeptical last July when three major European comp3ter manufacturers -- Siemens (Germany), CII (France), and Phillips (The Netherlands) -- announced they would build and market a common product line from a combined organization called Unidata. So it came as quite a surprise last week when Unidata announced its first product -- a system called 7.720 -- only half a year after the agreement was signed. In fact, convincing people that it means business may have been one of Unidata's reasons for the quick announcement.

How did Unidata come up with a new product in six months? Probably by adapting a system that Siemens reportedly has had in the works since 1972 -- a system in the 370/125 size and price range that was originally scheduled for delivery this summer. And the 7.720 fits the description, offering 48K to 160K bytes of main memory, 16 million bytes in virtual storage, similar processing power -- for a minimum rental of $5,000 per month. Microprogramming plays a big part in CPU functioning and is used to make the 7.720 compatible with Siemens, CII and Phillips products. The communications-oriented system is due for first delivery in a year.

Reports from IDC France -- International Data Corp.'s French subsidiary -- indicate that several American manufacturers, notably Honeywell and Univac, are interested in joining the Unidata clique in order to strengthen their footholds in Europe. A merger with CII is one approach a big outsider might try.

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IBM UNVEILS A REMOTE FRONT-END PROCESSOR FOR BUSINESSES

During the past year IBM entered the point-of-sale market and set new standards with its retailing, banking and supermarket systems. Now the big mainframer has taken the wraps off still another operator and communications-oriented system that seems to owe a lot to the controller-centered design of its POS offerings -- but is aimed at more general office applications.

The 3790 communications system -- organized around the 3791 disk-based remote controller -- was configured with the vast insurance industry in mind. But no doubt it will find a place in many other businesses that generate blizzards of paperwork -- and maintain files -- in widely scattered offices, plants and warehouses.

As many as 16 desk-top terminals, including modified Selectric II typewriters with operator guidance features, can be connected to the controller for on-line interaction with a virtual storage 370 at another location. The controller, with up to 28 megabytes of disk storage for user programs and local files, also checks and processes documents on-site -- "freeing the central computer for other tasks." That's a change of tune for IBM!

The 3791 controller stores a variety of programs -- written and tested at the central computer site -- to handle document preparation, data entry and inquiry, and routine calculations. Data entered into the system can be stored in the controller and forwarded to the host computer during off-peak hours. Operators can use as many as 16 different programs at one time, or several may use one program simultaneously. If communications with the central computer break down, the controller will handle the system by itself until the line is restored.

No application packages

IBM hasn't developed any application packages for 3790 -- the programs used by the controller will be highly specific to individual users, who will have to develop programs to fit their own data handling formats and business needs. These programs will be stored on disk and called up as needed by each operator -- main memory within the controller will consist mostly of control storage to handle terminal functions, an IBM spokesman said.

One controller will accommodate up to four 3793 keyboard/printers (the modified Selectrics), eight 3277 CRT display stations and a medium speed line printer. Adding an auxiliary control unit can bring communications terminals at remote subsites into the system. Optional operator identification codes and passwords are available to protect sensitive stored data.

Designed to be used by front office personnel, the 3790 definitely represents a new IBM effort to push computerization onto the front lines of everyday business activity. Eighteen months ago it was reported to IBM's top management that the Giant's 10-12% growth objectives within the insurance industry could not be met by concentrating only on "volume-dependent" applications. Strategies aimed at helping insurance companies cut paper and clerical costs and improve data entry were among the remedies offered. And the 3790 looks like one of the answers.

First shipments of the new system are scheduled for a year from now. Cost will vary according to configuration, but IBM listed one typical system with six terminals and a line printer at $100,000, or $2,800 per month rental.

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• MCI COMMUNICATIONS CORP. WON ANOTHER ROUND against AT&T -- and possibly some relief from its recent financial troubles -- when a federal judge in Philadelphia ruled that Ma Bell must supply local interconnections between MCI customers and MCI's private line microwave network on the same basis as the telecommunications giant supplies such services to its own Long Lines department.

Bell System companies began a campaign of active resistance to MCI's competition in the private line market last year by refusing in some cases to supply the interconnections MCI needed, claiming it shouldn't have to serve competitors on the same basis as other users. MCI, the first and largest of the new specialized common carriers, had to borrow money and lay off employees to weather the crisis when customers began shying away. Now it expects business to boom -- if Ma Bell doesn't think up some new way to load the dice.

• ANOTHER GIANT BACKED DOWN AT THE THREAT of legal action by a tiny competitor last week. Sanders Associates Inc., a manufacturer of IBM-compatible display terminals, cried "foul" when IBM announced it would not support the software interfaces used by Sanders and other plug compatible manufacturers on its virtual storage systems. That policy would have forced Sanders customers either to develop their own software or buy new IBM terminals when they moved to VS. IBM lawyers met with Sanders counsel several times last year -- and reportedly made no concessions until after the Telex anti-trust decision came down. Now the Giant has promised to maintain the interfaces -- but claims in public that requests from customers were the reason it changed its mind.

• UNIVAC HAS PURCHASED $4 MILLION worth of shared processor data entry systems from Pertec Corp. under a three-year contract that's expected to total $15 million by the end of the period. Univac said it will announce a new product incorporating the shared processor system in the near future.

• SINGER CLAIMED TO HAVE MORE THAN 32,000 of its point-of-sale terminals installed worldwide by the end of 1973 -- and boasted a backlog of more than twice that number. Singer said its installed base and backlog represented $350 million worth of orders and more than half the current POS market. Singer just won a contract for up to 10,000 terminals from F.W. Woolworth -- a former Pitney Bowes-Alpex customer -- and J.C. Penney, an early Singer customer, has given NCR a potential $60 million order.

• GRAPHNET SYSTEMS HAS BEEN AUTHORIZED BY THE FCC to build the first commercial facsimile and data-to-facsimile communications network. Scheduled to begin service among 26 cities within 18 months, Graphnet will offer packet switched store and forward transmission of black and white copies among facsimile machines of all types, coast-to-coast, for about $1.50 per page.

The company will use common carrier lines and message processing centers to transmit not only among all facsimile machines, but from CRT-to-facsimile and computer-to-facsimile as well. The service includes broadcast transmission of documents from one source to many locations -- rates for high, normal or overnight priority service will be independent of distance within the continental U.S. Graphnet, a subsidiary of Graphic Scanning Corp., Englewood, NJ, is the second "value-added" carrier authorized by the FCC. Packet Communications Inc. became the first approved VAN last November when the FCC endorsed its plan to build a packet switched data transmission network.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 30,1974 • VOL.9,NO.8 P.J.McGOVERN,PUBLISHER

Minicomputers . . . DP busybodies? -- page 2

JUDGE CHRISTENSEN PAVES WAY FOR 'CENSUS' DATA USE IN OTHER CASES, DENIES TELEX MOTION FOR DISCLOSURE OF SYSTEM/370 MEMORY DESIGN FEATURES

THE COURT: . . . And now here we have four forces to contend with and if we find ourselves in the dilemma of saying, in effect, that each Court waits until the other passes, we've got to involve a truck and a motorcycle and a passenger car and the horse and buggy all at the same crossing, each waiting until the other goes on. And if anything --

MR. BARR: I sort of have the feeling I'm standing there in the cross road and they are all going to start at the same time.

Mixing rhetorical exchanges with what proved to be winning arguments, IBM's top outside counsel, Thomas A. Barr of Cravath, Swaine & Moore, successfully argued in Tulsa mid-January, that:

- The "census" of EDP industry participants -- compiled during the pre-trial stages of the CDC litigation and used during the Telex trial -- will be transferred to New York's Southern District court (where the Justice Department case is progressing) and, at the request of any party, to "any other court before whom an antitrust action involving IBM is pending."

- The minimum memory specified by IBM for the VS/370s (135, 145, 158, and 168) is not a peripheral product as defined by the Judge in his decree (EDP/IR Nov.20,1973). Therefore, IBM does not have to disclose the "interface" between these 370 CPUs and their minimum memory. To do so, the Judge ruled, would substantially require disclosure of internal design details . . . "some of the very things that the Court considered in attaching liability to Telex for attempting to obtain, through trade secret encroachments."

So once again, IBM has grabbed another dab of victory at the scene of its only major court defeat in history. The trebled damages of $259.5 million still stand against IBM, and the entire Telex case is awaiting appeal arguments in the Tenth Circuit Court of Appeals. And IBM must still provide interface information on products cable-connected to its CPUs. But the decision that a significant por-

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tion of minimum memory is, in effect, part of the central computer could have major implications for future IBM products, at least. Plans made public during the Telex trial disclosed that future hardware will be designed with software considerations in mind (EDP/IR Jan.16,1974). Already, microcode is used in more and more products; integrated circuits can and do include functions that logically belong in different mainframe and/or peripheral "boxes." The Court recognized this general trend in its decree; now, it has emphasized its earlier statement that it "does not intend to inhibit technological changes which may alter the definition of what today may be a separate product."

New data to be made public

The material in what will now be called Census I was collected during 1970 and 1971 and includes exhibits and depositions from more than 2,000 participants in the data processing industry . . . and fills 12 file drawers in Tulsa. IBM argued that the same material -- plus more -- will be needed in preparing for the government suit. Now, copies of the material will be transferred there; also, it can be requested for any other court where IBM is being tried, provided notice is given to DEC, Burroughs, GT&E, Honeywell, and Sperry Rand -- companies that requested and obtained the original protective orders.

In compiling Census II for the government trial scheduled to open Oct. 7, some 2,500 companies will receive "small" subpoenas for information, 500 will receive "large" subpoenas, and mainframe manufacturers will receive "very large" subpoenas according to IBM and government counsel during courtroom discussions. Already, IBM has subpoenaed about 100 companies for depositions, the government 67. And Judge Edelstein, in charge of The Big Case, has indicated that most information will become public. He says, however, he will grant temporary protection for some witnesses until they can convince him information is proprietary.

MINICOMPUTER APPLICATIONS ARE BEGINNING TO MULTIPLY LIKE CRAZY; TELEPROCESSING, AUTOMATION, AND RETAILING HAVE BEST POTENTIAL

According to a recent study by International Data Corp. (EDP/IR Nov.9,1973), U.S. minicomputer manufacturers will ship nearly 50,000 machines during 1974. What's more, shipment rates will grow at an equally phenomenal pace throughout this decade, raising the world population of minis to the hundreds of thousands.

What will people do with all those minis? Just about everything imaginable. Minis are becoming the busybodies of the data processing industry . . . poking their noses into nearly every industrial, commercial or institutional activity that needs counting, managing, controlling, reporting or calculating. The diversity of minicomputer applications defies easy classification.

But IDC's survey of minicomputer manufacturers, systems houses and users did bring into focus a number of important application areas that loom large in the mini industry's optimistic plans for the future -- and are enough by themselves to justify forecasts of ballooning growth during the next few years:

- Support for large computer systems as front-end processors, communications controllers, data entry systems and intelligent remote terminals. The next five years will see a burgeoning of teleprocessing networks; computers using communications will increase by 20% a year and the number of minis at work in these applications will grow even faster.

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U.S. MINICOMPUTER-BASED TURNKEY SYSTEMS INSTALLED

	1973	1974	1975	1976	1977
Large System Support	5,025	8,000	12,325	18,550	26,750
Automation and Control	29,675	46,250	68,700	98,625	132,425
Commercial Data Processing	5,000	8,000	13,000	20,000	30,000
Consumer Products	-	-	-	400	1,375
TOTAL	39,700	62,250	94,025	137,575	190,550
% Total Minis Installed	60%	63%	65%	67%	69%

- Mini-based autotransaction and small business systems -- with many incorporated into communications environments -- will extend mini applications into a vast market that's hardly been tapped.

- Industrial automation systems will soak up minis by the tens of thousands as prices continue their steady declines. In some applications one mini -- built into a machine tool -- can do the work of many skilled operators. Process control is already one of the most important minicomputer jobs, but again, the surface has barely been scratched. The development of start-to-finish manufacturing control systems will add another dimension to mini applications in industry.

- The traditional use of minis for scientific and engineering computation will continue growing about 15% a year. Meanwhile, sophisticated commercial users are discovering that clusters of linked minicomputers can do many on-line tasks that would otherwise require a larger -- and far more expensive -- mainframe.

- In the more distant future, minis are likely to be turning up in consumer products -- automated games and personal accounting systems, for instance.

Individual minicomputers, though general purpose in architecture, tend to be used for dedicated applications. The fact that they're cheap enough to be applied to narrowly-defined, specialized tasks is the big advantage minis hold over full-scale machines -- but the specificity of their applications is also the biggest bottleneck in the movement of minicomputers into the marketplace. At best, programming a mini is no easier than writing software for a larger machine -- and users' software development costs often far outrun their investments in mini hardware.

Mini manufacturers have been trying to make life easier for end-users in recent years by adding high-level language compilers, beefing up operating systems and improving service. But in general, manufacturers haven't been turning out systems ready to go to work for the end-user. The user's only choices are to buy a mini and program it himself, buy his application software from another

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U.S. USER-PROGRAMMED AND CUSTOM-DESIGNED MINICOMPUTERS INSTALLED					
	1973	1974	1975	1976	1977
Problem Solving/analysis	6,000	7,150	8,450	9,885	11,450
Commercial Data Processing	2,600	3,600	4,875	6,535	8,630
Large System Support	7,675	11,900	17,855	25,890	36,250
Automation and Control	9,425	13,200	17,550	22,465	28,070
Mixed	600	900	1,250	1,650	2,050
TOTAL	26,300	36,750	49,975	66,425	86,450
% Total Minis Installed	40%	37%	35%	33%	31%

source, or find a complete designed to fill his particular need. The complete "turnkey" system is the easiest way out -- but since mini makers lack the expertise and the capital to turn out such specialized products, they usually aren't available directly from the manufacturer.

This is where the OEM builder will play an increasingly important role in the growth of the mini market. IDC predicts, in fact, that two thirds of all new minis will be shipped on an OEM basis by 1977. By marrying minis to end-user equipment -- ranging from data entry systems to traffic lights -- OEMs will bridge the all-important applications gap between user and machine. In many such systems, minis will be nothing more than components buried in larger products.

Mini applications are hard to pin down into categories, but IDC has come up with one approach based on the visibility of minicomputers to their users in the applications concerned:

- General purpose minicomputers are purchased by end users from either a mini manufacturer or systems house for a customized application. The computer is highly visible to the user, who usually does the programming himself. Problem solving/analysis systems fall into this category.

- Stand alone commercial data processing systems also are highly visible -- but come with packaged software for general accounting/payroll, etc., within small companies, or other packages for use in a specific sector of a large companies operations.

- Large computer support systems incorporate minis into some other data processing gear such as key-to-disk systems, graphic displays and plotters, or communications controllers.

- Automation and control systems combine minis with a non-computer product to improve the efficiency of the system. Process and quality control are major applications; turnkey systems for traffic control and baggage routing are two early examples of mini-supervised products that are beginning to move automation out of the factories.

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Significantly, the number of minicomputers in use in each of these application categories goes up as "visibility" decreases -- the "out-in-front" minicomputer is relatively rare compared to the number buried in OEM products. The IDC survey indicated the following distributions:

	1972	1977
Automation	59%	57%
Large computer support	18%	23%
Commercial data processing	10%	14%
General purpose (problem solving)	12%	4%
Consumer	-	1%
Mixed	1%	1%
	100%	100%

While these figures reflect changing patterns of minicomputer use, they do not represent corresponding shifts in revenues for mini manufacturers. OEM minis are sold at large discounts -- prices are falling rapidly -- and tend to be small machines. End-user systems, on the other hand, are growing more powerful -- edging toward full scale capability in some cases -- and the average value of new end-user systems is declining much more slowly than average OEM values.

Despite the problems involved in producing turnkey systems for specialized uses, a number of prospective markets for such systems are so large and potentially profitable that mini manufacturers may well be tempted to develop products for them. Some of the most promising of these sectors are:

- Printing and publishing, one of the first sectors to use minis extensively. DEC is producing a complete typesetting system for publishing houses and diversifying its system for other uses. Some systems in the works will completely automate newspaper composing rooms, processing copy all the way from a reporter's CRT to the printing press.

- Gas stations and other businesses with dispersed customer bases. Large mini companies are in a better position to provide service to such customers than most OEM houses. Mini-based traffic light systems have proven very efficient in early trials. Autotellers for branch bank sites may also become popular mini products.

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IDC study indicates

INSURANCE INDUSTRY COMPANIES TURN TO ON-LINE NETWORKS

Data processing spending patterns in the profitable and steadily growing insurance industry -- traditionally a rich market for computer vendors -- are likely to see marked change during the coming year, according to a recent study by International Data Corp., publisher of EDP/IR. After heavy mainframe purchases in 1973, insurers will be funneling dollars into remote terminals and teleprocessing during 1974, the IDC study indicates.

Insurance companies responding to the IDC survey said their spending for computers will drop -- after spurting 51% during 1973 -- while outlays for intelligent terminals, interconnect equipment and line costs will jump 33% as the larger companies move further toward remote on-line data entry and inquiry networks to handle their widely dispersed processing needs.

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Corporate Assets Vs. EDP at U.S. Insurance Companies
(Source: IDC's June, 1973 Data File)

Corporate Assets	*Avg. $M Assets*	*No. Corps*	*No. Sites*	*No. CPUs*	*EDP $M Value*	*Avg. EDP $K/ Corp.*[a]	*% EDP/ Assets*
<$1,000,000	$ 0.6	28	28	32	$ 3.0	$ 108	18.00%
$1,000,001-$5,000,000	2.4	70	70	84	16.4	235	9.79
$5,000,001-$10,000,000	6.0	73	73	83	31.7	434	7.23
$10,000,001-$50,000,000	24.0	139	139	189	137.7	991	4.13
$50,000,001-$100,000,000	60.0	71	71	134	126.9	1,788	2.98
$100,000,001-$500,000,000	240.0	26	26	73	95.1	3,659	1.52
$500,000,001-$1,000,000,000	600.0	34	81	193	174.7	5,138	0.86
$1,000,000,001-$5,000,000,000	2,000.0	17	20	84	107.9	6,348	0.32
$5,000,000,001-$10,000,000,000	6,000.0	7	32	77	112.6	16,079	0.27
>$10,000,000,001	21,700.0	4	14	123	139.6	34,900	0.16
Subtotal	$ ≤ 332.0	469	550	1,072	$ 945.6	$2,016	0.62%
NA	NA	306	306	438	$ 344.0	$1,124	NA
TOTAL	NA	775	860	1,510	$1,289.6	$1,664	NA

Among the companies making major investments in networks are:

- Equitable Life Insurance Co., the number three life insurer with assets of $16.4 billion at yearend 1972, is building a nationwide computer communications network extending from its two major DP centers in New York and Pennsylvania.

- INA Insurance Co. expects to handle 80-90% of its policies through its CRT network connecting 50 branch centers by 1975. INA's computer operations are handled by the Electronic Insurance Systems Division of Data Corp., a sister subsidiary of INA Corp.

Significantly, the insurance industry shows a strong concentration of CRT use in its processing systems. The IDC study indicated that 16% of insurance computers use CRTs, nearly twice the percentage found in other industries. Furthermore, insurance sites tend to have more CRTs -- an average of 20, in contrast to 15 in other industries. With its tremendous record checking and updating requirements, this high use of visual displays isn't surprising.

Naturally, the trend toward distributed processing is clearest among the largest insurance companies -- of which the top five alone account for $100 billion in assets -- while the multitude of small life and fire/casualty companies are directing their efforts toward better centralized processing. Firms in the middle range tend to have centralized operations, but will be moving to networks as costs drop and their assets increase.

This difference in policy between the large and small companies isn't hard to understand. The small companies are more localized and their DP costs are a much bigger factor in their modest budgets. Some small insurers have as much as 18% of their assets invested in data processing -- while Prudential Life's DP investment, the largest in the industry at well over $70 million -- represents a mere 0.2% of its huge assets.

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Over the long range, the insurance market promises to remain one of the computer industry's best customers. The assets of all life insurance companies -- the mainstay of the business -- totaled $222 billion by the end of 1971 after an eight-year growth record averaging 8.5% annually. Rising per capita income and the stablizing mortality rate should keep this growth strong.

Since efficient data handling is one of the keys to a successful insurance business, insurers are forced to take maximum advantage of the cost-cutting opportunities and better customer service offered by sophisticated data processing systems. The installed base of computers at insurance company sites in the IDC Data File totaled more than $1.3 billion in June, 1973 -- and more than half this amount was concentrated at 10% of the sites listed.

IBM dominates insurance industry computing rooms overwhelmingly, with 82% of the installed base as opposed to its 68% share of the overall market, the IDC study indicates. The Giant's dominance may be partly a reflection of the insurance industry's generally conservative computer evaluation policies -- since the cash-rich insurers show a far greater tendency to make outright purchases of their equipment, they have some reason to be more cautious than rental users. The IDC Data File yields the following rent/lease/purchase breakdowns by dollar value:

	rent	lease	purchase
All industries	40%	23%	37%
Insurance industry	34%	13%	53%

Among other mainframers, Honeywell also enjoys a higher penetration of the insurance market than in other markets -- 10.2% of the dollars against 8.3% overall. Burroughs and NCR, on the other hand, have almost negligible amounts of insurance business, supplying mostly smaller machines.

The data entry bottleneck

The insurance companies surveyed by IDC repeatedly listed data entry as their number one problem. Key-to-disk was the most frequently mentioned prospective solution, followed by source data capture through inexpensive intelligent terminals. Here again IBM seems to be on top of things with its new 3790 remote data entry system aimed at insurance problems (EDP/IR January 16, 1974).

With the industry's 370 buying spree now apparently past its peak, IBM is eager to keep its insurance revenues growing -- and the new 3790 seems to be right on time to fill the distributed processing/data entry requirements the big insurers are trying to meet. This pre-packaged communications system could make the shift to teleprocessing a lot easier for some users -- but sophisticated users, on the other hand, could be inspired to put together their own systems with less expensive components.

Looking ahead

Some of the larger insurance companies, already well established in electronic data processing, will be tightening EDP budgets and consolidating operations over the next few years, resulting in a general drop in spending. Among small to medium-sized companies, however, growth should continue at 5% to 10% a year as they continue beefing up their operations and cut back on outside batch services and other less sophisticated techniques.

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• HONEYWELL INC. TOOK OVER ANOTHER portion of GE's data processing business this month with the acquisition of GE's Process Control Products Division in Phoenix, AZ. The cash purchase gives Honeywell "total capability" in the process control market, a spokesman said. The company will produce a full line of computer-based systems taking advantage of GE's experience in the power, foundry and fluid process markets. The deal includes manufacturing facilities, personnel and technology, and hardware/software sold under the GE-PAC 4000 trademark.

Honeywell says its new division in Phoenix won't conflict with its established process control operations in Ft. Washington, PA -- which function separately from the Information Systems Division. The two process control centers will be manufacturing "complementary" lines of equipment -- and, Honeywell hopes, will bring the company into the first rank of process control suppliers. Meanwhile, GE will continue to incorporate the systems it developed in its automated controls for nuclear steam supplies, machine tools and steel mills.

• ITEL CORP. HAS ANNOUNCED A NEW DISK FILE -- the 7330 Model II -- with a "double density" capacity of 200 megabytes. The new device, scheduled for delivery next year, is designed to be a "direct low-cost replacement" for the IBM 3330 Model 11 disk device announced last July. Lowest lease price is $595 per month, or $32,000 purchase. Meanwhile, Univac unveiled its new 8430 disk subsystem -- produced by Information Storage Systems, which Univac acquired last year. The 8430, designed for use with the new 90/60 and 90/70 computers, offers up to 16 disk units of 100 megabytes each for a top capacity of 1.6 billion bytes of on-line storage. Price of a minimum configuration -- a controller and two drives -- is $107,500.

• AN ANALYSIS BY INTERACTIVE DATA CORP., a time-sharing firm specializing in financial data, shows that only 197 common stocks on the New York Stock Exchange and 98 stocks on the American Stock Exchange showed overall gains in value during 1973. More than half of all stocks on the Big Board and almost 75% of Amex issues fell 30% or more from January 1 to Dec. 31, according to IDC. Losses were most severe during the fourth quarter, averaging 15% per share on the NYSE and 21% on the Amex board.

• GENERAL ELECTRIC'S INFORMATION SERVICES DIVISION will considerably expand the computing capacity of its international computer service network with a new "supercenter" in Rockville, MD. The new center and division headquarters will be completely integrated over high-speed communications lines with GE's present center near Cleveland. The steadily growing network currently serves 350 cities from Australia to Western Europe with a pool of 100 computers.

• BOEING HAS BEEN GRANTED EXCLUSIVE RIGHTS to manufacture and sell an archival "flat plane memory" system developed by Xynetics Inc. to government users. The photographic storage and retrieval system stores documents in printed, pictorial or computer output form on high-resolution film -- in a way that lets any record be located and displayed -- at remote terminals -- within one to three seconds. The system offers low-cost mass storage without the need for converting printed or graphic data to digital form, its developers claim.

• INFORMATICS INC., A MAJOR SOFTWARE HOUSE, should win a foothold among the 25,000 users of System/3 with its purchase of System Three Inc., a users association founded in 1972 to offer software and information support to members.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" FEBRUARY 13,1974 • VOL.9,NO.9 P.J.McGOVERN,EDITOR

Keeping ahead of IBM

REMOTE TERMINALS ARE GETTING SMARTER AND CHEAPER; CONTROLLER-CENTERED CLUSTERS LEAD THE WAY TO OFFICE APPLICATIONS

With the introduction of its new SPD 20/20 clustered display processing terminal last week, Incoterm added still another piece to the fragmented and spectacularly growing puzzle that makes up the processing terminal market. The latest Incoterm offering -- a fully programmable processing and communications terminal serving a cluster of CRTs and other peripherals -- and a second new offering, the IBM 3270 compatible SPD 320 -- are typical of the approach many independent terminal makers seem to be taking to the fast-changing market. The motto seems to be: Hold hands with IBM but keep a few steps ahead at the same time.

"We'd rather outsell IBM than sue them," as one Incoterm spokesman put it. That means coming up with a steady stream of new and better terminals faster than IBM can make them obsolete. And while the independent manufacturers seem to be doing a lot of independent thinking in the effort to stay ahead, their product lines appear to be evolving along strikingly similar lines:

- Intelligent terminals are turning into full-fledged processors powerful enough to handle data entry, preprocessing and communications functions all at once -- proving that if you can't sell mainframes, you can at least steal work away from them.

- Terminals are becoming more and more operator oriented. Sophisticated programming yields simpler operation -- and low-cost clusters of keyboards and CRT displays around local processors bring data entry/inquiry capabilities to the people who need them.

- Some processing terminal systems are evolving toward true stand-alone capability -- and could start edging into the small business computer market within the next few years. The availability of many high-performance miniperipherals may increase their attractiveness as self-contained systems.

There's nothing really new about the idea of clustered, programmable processing terminals. The Incoterm 320 joins a growing roster of display terminals designed as direct replacements for the IBM 3270 -- the Sanders 8170, Sycor 275, Four Phase IV/40, etc. -- while the more elaborate SPD 20/20 follows in the foot-

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steps of the powerful Four Phase IV/70, first introduced in 1970, and Datapoint's remote processing systems.

But the new offerings do appear to yield significant improvements in price/performance -- and that's the name of the game in the terminal market now that effective interactive communications gear is widely available. The SPD (Stored Program Display) 320 comes with up to 32K bytes of fully programmable memory, can handle a cluster of up to 16 keyboard/CRTs and 16 printers (165 cps vs. 66 cps on the 3270 printer). Data transmission rates up to 9600 bps are available, contrasted with a top rate of 4800 from IBM. And the price is about half IBM's.

The SPD 320 is a special version of the SPD 20/20, a larger system that adds eight I/O channels for high-speed printers, disks, tape drives and card readers. With an optional disk-resident operating system the 20/20 can even act as a stand-alone data processing system. Having achieved early success in the intelligent terminal field with its original SPD 10/20 terminal, Incoterm hopes to sell its new products across the entire spectrum of the visual display market.

Seeking new kinds of customers

The introduction of the SPD 20/20 furthers a trend recently blessed and confirmed by the unveiling of IBM's 3790 remote processing/communications system -- a push into "soft" markets for remote processing terminals. Having first developed customer bases among users who were critically dependent on advanced, operator-oriented data communications systems -- such as airlines, railways and brokerage houses -- manufacturers are now turning their sales efforts toward the vast number of potential users who will need more convincing before they spend a lot of money on data networks.

Several factors make the time seem ripe for this expansion:

- Data transmission is becoming cheaper and more reliable -- the introduction of AT&T's first all-digital service and the launching of the first domestic communications satellites this year, as well as the proliferation of independent carriers -- should go far toward cutting costs and reassuring skeptical users.

- Electronic memory and processing power are becoming cheap enough to be cost effective even in "wasteful" applications where the hardware stands idle much of the time -- and devotes a lot of its activity to making life easier for untrained operators.

- Experience in developing remote processing systems for critical applications has laid the groundwork for the more general application of remote intelligence to retailing, office processing, factory data collection and other general uses.

As prices fall and applications broaden, the development of processing terminal systems is paralleling the growth pattern of centralized processing during the 1960s -- intelligent terminal manufacturers are beginning to develop complete product lines of mutually compatible and upgradeable equipment designed to "lock in" customers as they increase the sophistication of their networks.

The terminal market is one of the fastest growing sectors of the computer industry. The number of general purpose terminals in use will triple to nearly

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U.S. OPERATOR-ORIENTED TERMINALS INSTALLED 1972 AND 1977

	Number Installed		Terminals Shipped 1973-77		
	1972	1977	Number	$M	% Total $
Conversational	187,000	507,000	459,800	$1813	41.7%
CRTs	9,000	29,000	26,000	79	1.8
Printers	178,000	478,000	433,500	1734	39.9
Editing	77,500	239,000	223,725	906	20.9
2260/3270 Compatible	65,000	230,000	219,800	879	20.3
Other CRTs	10,500	5,000	--	--	--
Printers	1,500	4,000	3925	27	0.6
Processing	16,000	160,000	153,100	1626	37.4
CRTs	5,000	60,000	57,500	288	6.6
Printers	11,000	100,000	95,600	1338	30.8
TOTAL	280,500	906,000	836,625	$4345	100.0%

a million by 1977, according to recent estimates by International Data Corp., and special application terminals -- including consumer oriented point-of-sale and banking devices -- will snowball even faster.

The types and uses of these terminals are so diverse that strict classifications are almost impossible to define. IBM, uncharacteristically, holds less than half the overall terminal market and the field is wide open to independents. More than 100 companies manufacture either general purpose terminals or application-unique devices designed to complement their specialized data services, POS systems, credit verification networks or other offerings. But equipment now on the market tends to fall into distinct types:

- Operator-oriented terminals generally consist of a keyboard for data entry and inquiry, and a CRT or printer for output from the host computer or controller. Increasingly, these terminals support multiple keyboard/display stations for office applications.

- Machine-oriented terminals are usually batch devices that transmit data from a card reader, tape drive or other machine to a central computer -- and receive output in machine-oriented form as well. The operator doesn't communicate directly with the host computer.

- Application-unique terminals usually are suitable only for one specific job -- an automatic bank teller, for example. The information appliances often don't look much like computer terminals.

Recently, with the announcement of IBM 3790, the Datapoint 5500 and the new Incoterm products, among others, these distinctions have begun to blur a bit. All unveiled within the past few months, these systems have a lot in common. And they don't look too much like anything seen before. All these systems support clusters of CRT stations . . . perform editing and data entry functions

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by means of a local programmable controller . . . communicate interactively with the host computer . . . can perform some stand-alone processing and even maintain a local on-line data base . . . and are aimed -- pricewise -- at front office applications that have traditionally required lots of paperwork.

Filling a gap

Spokesmen for Incoterm and other manufacturers say the new controller-centered terminal systems with small clusters of 4 to 16 CRTs evolved from established configurations that were either very large clusters controlled by a large mainframe or dual station systems in which one terminal was "slaved" to another to save money. Experience with such systems stimulated customer demand for intermediate configurations. These small clustered systems are developing simultaneously in two directions -- while their communications capabilities are increasing, so are their local processing capacities. The trend toward small-unit clustering parallels a number of other strong trends in terminal design:

- Commonality and compatibility -- terminals must fit into networks encompassing a great variety of peripherals and host computers, demanding myriad interfaces and emulation features. Basic components are rapidly becoming more standardized.

- More I/O capacity to handle the vast array of inexpensive printers, auxiliary memories, tape drives and other peripherals now available. The appearance of these devices is a major reason for the increasing effectiveness of remote processing systems.

- Integrated communications control -- the arrays of minicomputers, preprocessors and multiplexers used to control teleprocessing networks may melt away as increasingly powerful terminal processors take over the jobs of line monitoring and concentrating data for transmission in addition to their other functions.

- Better software will be a necessity as processors become more sophisticated and applications more diverse. Datapoint already offers COBOL and even a time-sharing system on its 2200 clustered terminal. Several manufacturers supply cross assemblers for compiling controller programs on large mainframes.

Defining the market

Who will use these systems? Industries with widely dispersed data bases and data entry requirements, their manufacturers say vaguely. Understandably they aren't anxious to narrow the field any further -- because the systems are designed to be as adaptable as possible and manufacturers are hoping that users will take the lead in dreaming up applications for them. But a recent study of terminal use by International Data Corp. suggested that a number of "environmental" factors will affect how readily various industries move to take advantage of these sophisticated remote systems:

- Industry structure -- the extent to which an industry is dominated by large companies means a lot in determining its potential for terminal use. Large firms have potentially greater networking needs and possess the cash and expertise to develop new applications for terminals.

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- Company structure -- transportation and communication companies are networks in themselves and lend themselves to on-line network-development for scheduling, reporting, reservations, etc. Other companies with widely dispersed operations and centralized management are also ripe targets.

- Competition -- in highly competitive businesses, tight profit margins and the need for good customer service demand the most up-to-date and efficient data handling methods.

- Data turnaround requirements -- the need for rapid information flow must outweigh the costs of re-orienting a business around a data communications network.

Manufacturers see the most immediate markets within banking, insurance, law enforcement, transportation, manufacturing and the medical fields. One of the best ways they've found to develop customer bases in such sectors is to win a large order from a major company interested in applying terminals to a specific problem or networking system. Once they see how it's done -- and that it can be done -- other companies often jump on the bandwagon and become terminal customers. Incoterm's airline and railway customers are prime examples of this phenomenon.

How many of the myriad independents who have jumped into terminal manufacturing will survive and prosper remains to be seen. Quite a few have already foundered . . . and it's a safe bet that many more will come to grief in this rapidly expanding . . . but fiercely competitive . . . market for display, data entry and remote processing equipment. The future is likely to see considerable consolidation among general purpose terminal makers. And as the optimum designs for these machines become more clearly defined, the market seems likely to fill the coffers of those who survive.

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NCR finally sees computer profits

MAJOR MAINFRAMERS CHALK UP ANOTHER STRONG YEAR
SOLID BACKLOGS INDICATE LITTLE SLACKENING IN 1974

Despite 1973's uncertainties and unpredictable economic gyrations, the year ended solidly for the five major mainframe manufacturers. Giant IBM's revenues rose 15% over the year before -- breaking the $10 billion mark -- and profits pushed up 23% to more than $1.5 billion.

Burroughs showed near-spectacular performance -- reporting the second-highest profit on the next-to-lowest revenues -- and increased earnings 32%. But NCR's showing may have been the truly blessed event in the family. NCR's computer operations made a profit for the first time since the company entered the field 13 years ago. NCR seems to be making a fast recovery from the huge write-offs it took in 1972 during the expensive changeover from mechanical products to electronic cash registers, point-of-sale terminals and accounting machines.

Honeywell, reporting profits from its computer business separately for the first time, said it took in more than $1 billion in computer sales and rentals during 1973, up 11% from last year. Profits from Honeywell Information Systems contributed 41% of the corporation's earnings -- but failed to equal the impressive profit margins on Honeywell's instrumentation and controls sales.

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MAINFRAME MANUFACTURER REVENUES 1973 VS. 1972

	$M 1973	%Δ	$M 1972
International Business Machines	10,993	15	9,533
Sperry Rand*	2,514	17	2,144
Honeywell	2,391	12	2,125
National Cash Register	1,816	17	1,558
Control Data	948	39	684
Digital Equipment*	332	54	216
TOTAL	18,994	16.8	16,260

* calculated on a calendar year basis

Control Data's reported earnings on computers and services rose from an insignificant $4 in 1972 to $17 million last year, barely enough to offset lower profits from its Consumer Credit Bureau subsidiary. Univac's fiscal year ends in March, but President Gerald Probst recently reported that computer revenues are now coming in at the rate of a billion dollars a year and backlogs are up 30% from yearend 1972.

In forecasting for the coming year, Probst struck a cautious note -- raising the possibility that continued energy shortages could reduce the industry's growth rate during 1974. Other industry leaders seemed to share his concern -- but all pointed to high backlog levels and the importance of computer in cutting waste during shortages as reasons for overall confidence.

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On the legal front

IBM WINS MINOR SKIRMISH WITH LEVIN . . . FILES APPEAL IN TELEX CASE

> *For this last reason alone, apart from the distinctions that can be drawn between Telex and the issues in the present case, I hereby deny the summary judgment motion.*
>
> -- Judge Whipple, Federal District Court, Newark

Almost like a ghost from the past, action in a case filed 18 months ago by Howard Levin against IBM has popped up to haunt the four West Coast litigants currently maneuvering to obtain a motion for summary judgement in their cases. In separate actions, CalComp, Hudson General, Memorex, and Marshall Industries have filed such an action, and a similar move by Transamerica Computer is expected. If granted, a summary judgement procedure would permit competitors within the disk drive industry to collect treble damages from IBM only upon proof of such damages . . . not upon additional proof of liability.

Where does the Levin case -- primarily keyed to the leasing business and going badly because credit risk plays a factor -- fit in? The quote above sums it up. Essentially, the judge in Levin has sided with IBM's argument that summary judgements are primarily applicable to cases brought by the Federal Government, and don't even apply to them until appeals have been exhausted. So, IBM argued and the court ruled, this maneuver doesn't belong in the process. And the judge made his ruling on the law . . . not on the particulars of the case.

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BRIEF EXCERPTS FROM IBM'S APPEAL IN THE TELEX CASE

The appeal in this case presents basic and important questions of law concerning the proper use, application and purpose of the antitrust laws.

At bottom the issue presented is whether the Sherman Act is properly applied when the result is to prevent and penalize competition through better products and terms and lower prices.

We believe that the District Court's own findings demonstrate that that is the way the law was applied in this case.

The District Court recognized that its decision presented fundamental legal questions when, after lengthy post-trial hearings and adoption of numerous and substantial amendments of its findings, conclusions, judgment and decree, it certified to this Court that "all" of the provisions of its decision raised "questions of law as to which there is substantial ground for difference of opinion."

IBM's intent was to be and to remain competitive. That necessarily means an intent to try to win competitive battles and it follows that competitors may lose if IBM "wins" unless, as here, the market expands and all competitors grow and thus share the fruits of that expansion. That will to win is not "predatory." Indeed, the motivation to win out over competitors by making one's offering more attractive is the principal business aim that makes the competitive system work. However, there are fair means and foul means. Heretofore the law has condemned the foul and encouraged the fair. The Court below condemns the fair and calls it foul. The decision below leaves no room at all for fair competition. Faced with substantial and accelerating losses to competitors' sharp price reductions and discounted 1 to 5 year leases, IBM competed with lower prices and "commonplace" new leases, as well as with better products. This was fair competition.

The real question -- which the District Court never addressed -- is: What should IBM have done? Nothing? That is certainly the necessary consequence of the District Court's decision. That result cannot be right. The Sherman Act does not prevent competition -- it requires it.

The result here on the merits is so absolutely contrary to policy, so unfair and unjust and so unprecedented that this Court . . . should reverse and direct the entry of judgment on the merits.

This doesn't have any direct effect on the "West Coast Cases," which IBM recently moved to consolidate and which are already assigned to a common judge, Ray McNichols of the District Court of Idaho. The judge is expected to hold hearings as convenient in Los Angeles, San Francisco, and his home court in Boise. But it must be considered a damper to enthusiasm the West Coast litigants may have over obtaining an easy way to the collection of damages. Thus, it is a minor victory for IBM in a minor skirmish in the entire legal war that is being waged.

Of much more importance to IBM, it would seem, is the Telex case, already decided against IBM to the tune of a quarter billion dollars (EDP/IR Nov.20,1973). On that front, IBM filed its appeal to the Tenth Circuit in Denver Feb. 7, right on schedule. The Telex reply is due in about a month.

The 148-page printed appeal is a classic of smooth writing and logical presentation . . . exactly what might be expected from a legal "superpower" such as Cravath, Swaine & Moore. Read through without rebuttal it is a very persuasive presentation (see box). But again it's only one side of the story. The next move belongs to Floyd Walker, who now will be tested in the higher courts.

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• THE MYSTERY OF THE NAKED MINI was cleared up last week -- confirming numerous rumors -- when Computer Automation admitted it has been quietly selling a faster version of the Naked Mini LSI it announced last spring. The originally announced model has yet to go into production. CAI explained that a correction in one of the LSI chips for the Type 1 had delayed first deliveries until April of this year. Meanwhile deliveries have begun on the unannounced Type 2, which is five to ten times faster and twice as expensive.

The only major difference between the two minicomputers is memory speed, according to CAI. Various memory sizes and speeds may be mixed within the same machine to fit the needs of different OEM customers, and the Type 1 can be upgraded in the field to a Type 2. Why was Type 2 kept a secret? CAI frankly admits it was afraid the news of the faster version would affect sales of its older models still in production.

• TWO MAJOR LEASING COMPANIES have decided to give up their portfolios of IBM 360s and write off losses on the ventures. Itel Corp., a diversified leasing company reporting revenues of $108 million last year, announced it has discontinued leasing 360s and will sell off its inventory to end-users as leases expire over the next two years. The company charged an estimated $30 million loss against its 1973 income.

On the same day as the Itel announcement, Dearborn-Storm Corp. revealed it will divest itself completely of its computer leasing division and take a loss of $13 million -- commenting that investment in offshore oil exploration looks a lot more profitable these days. Dearborn-Storm didn't say what will happen to its 360 inventory -- but there should be a plentiful supply of the old IBM machines on the used market at bargain basement prices during the next year.

• TWO MEDIUM SCALE COMPUTERS with "decentralized architecture" were unveiled this month as the first offerings in a new family from Xerox. Both the Xerox 550 -- a smaller machine designed for technical/real time applications -- and the general-purpose 560 feature central control of up to 21 input-output processors to produce an "optimum mix" of processing power for each user. Sounds like a harbinger of things to come in system architecture . . .

The systems offer extensive error detection and diagnostic features developed from the Xerox 530, and memory expandable to 256K 32-bit words. A new line of peripherals was also announced for the two systems. Xerox quoted "typical" rentals of $7,524 per month for a 550 with 64K and $17,000 per month for a 560 with 96K. First deliveries are scheduled for the end of this year.

• UNIVAC MAY KEEP THE KEYPUNCH MARKET ALIVE and breathing a bit longer with its new line of microprogrammable high-speed keypunches. Designated the 1800 Series, the buffered 80 column keypunches offer verification and checking functions under programmed control. The new devices -- renting for $132 to $183 per month -- are designed to give current users of Univac's successful 1700 Series an inexpensive upgrade path. The company says more than 50,000 of its 1701 and 1710 keypunch devices have been installed since the series was announced almost six years ago.

• HONEYWELL INC. HAS SET UP A BUSINESS ARM to sell and support its computers in the Far East market. Its territory stretches from Japan and Australia to India.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GREY SHEET" FEBRUARY 27,1974 • VOL.9,NO.10 P.J.McGOVERN,PUBLISHER

Solid prospects for '74

USERS SAY EDP SPENDING WILL HOLD STRONG DURING THE YEAR; MARKET GROWTH WILL CONTINUE DESPITE ECONOMIC UNCERTAINTIES

Most sectors of the data processing industry should see steady growth throughout 1974 -- even if the threat of recession looming in the back of businessmen's minds becomes reality, according to International Data Corp.'s annual study of user spending plans. Ups and downs in the stock market during 1973 -- mostly downs in fact -- and the growing shortages of fuels and basic materials have prompted caution in most business projections for the coming year, but IDC's study indicates that EDP vendors have plenty to be confident about.

Users budgets for equipment, services and salaries are up 15% over 1973, with the largest increases aimed at acquiring new hardware for teleprocessing applications. The IDC user spending study -- based on an analysis of EDP budgets at 600 U.S. sites in December combined with a long-range study of management attitudes at 50 key "Fortune 500" companies -- suggests that growth may be even stronger this year than last.

A number of basic demand factors should combine to maintain growth in spending and protect the industry from a recurrence of the 1971 downturn:

- The business outlook remains strong for industries representing 80% of the installed base of EDP equipment. These industries will need steadily growing data processing capacity to handle business and administrative transactions.

- Better management of systems capacity in recent years means there's not much slack capacity waiting in users' computing rooms. Growing demand will have to be met with new equipment.

- Careful planning of data processing expansion means that users must make commitments to growth far in advance -- lead times of two years are typical for major systems these days -- and long-range planning tends to override temporary economic fluctuations.

- Shortages and rising costs are underscoring the need for efficient management of human, financial and material resources -- prompting users to look for new ways to automate and streamline.

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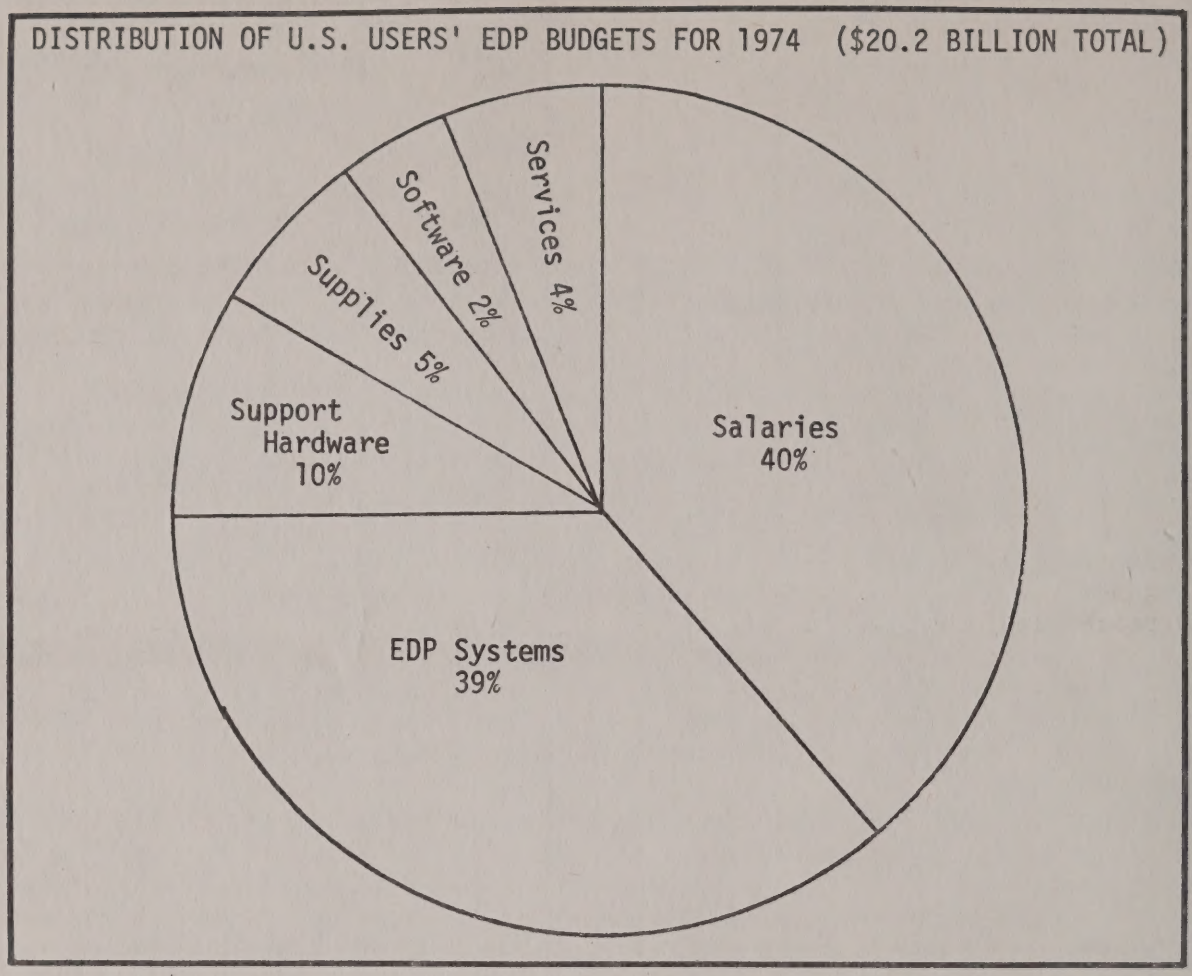

Including salaries for in-house personnel, EDP spending in the U.S. will total $20.2 billion in 1974 -- up from $17.6 billion last year -- according to IDC estimates. Outside expenditures alone will grow 16% to $12.1 billion. None of these figures includes timesharing outlays by non-computer users (such as scientists), software that's included in consulting/CPA services or salaries for clerks, bank tellers, etc., who enter data via POS terminals or other remote sources.

Naturally, spending patterns among large organizations with advanced data processing capabilities already established will be different from those of the more slowly evolving smaller users and new users. The demand for new data processing equipment and services tends to vary according to the user's size in the following ways:

- Among the 750 large organizations that account for more than a third of the installed base, spending will rise by a carefully planned 5% to 8% this year. Many of these companies and institutions will be putting on-line teleprocessing networks into service, stimulating demand for communications hardware. Sophisticated DP executives on the lookout for the best possible price/performance bargains will be good prospects for the PCM vendors.

- The heart of the DP industry's growth potential -- the medium-sized organizations that account for more than half the installed base -- will increase spending 12% to 18% during 1974 as they

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begin to implement teleprocessing networks and data base applications. These companies will be beefing up their DP hardware more extensively than the largest organizations.

- Small users, generally with one site and CPU, will be developing basic applications and buying packaged software. Spending by these users will increase 10% to 12% this year. Small users, lacking extensive in-house expertise, tend to follow the leads of vendors in upgrading DP operations.

- New users who move to electronic data processing from manual or mechanical methods usually show strong growth potential once they've made the initial investment.

Among the large and medium scale users, several important trends in the evolution of data processing continue to concentrate spending into distinct growth areas. Users are consolidating processing power at centralized sites and in larger CPUs, eliminating scattered medium scale systems. This centralized processing power is distributed by rapidly expanding teleprocessing networks linking central sites to remote terminals for data entry, inquiry and remote problem solving.

The mainframers, for their part, are trying to concentrate more DP dollars in hardware sales by offering machinery that can take the load off programmers and data entry personnel. IBM -- with virtual storage and its sophisticated disk systems, for instance -- is recapturing some of the growing flood of dollars budgeted for in-house programming staff. Users' budgets for outside DP spending rose 16% this year, twice the rate of increase planned for personnel salaries.

Spending distributions

The distribution of spending on major budget items showed only slight changes over recent years -- with an expected growth of emphasis on support hardware for communications and teleprocessing:

- Salaries will eat up 40% of the average DP budget during 1974. Users are looking for fewer but more highly skilled specialists to develop and maintain their DP operations. On-line data entry from the source -- a possibility that helps make networking attractive -- is drawing salary dollars away from the traditional keypunch operator.

- EDP systems will take 39% of the dollars and support hardware will account for another 10%. Users say they're willing to pay for the best equipment available -- but will also try to save money through long-term commitments to third party leases and outright purchases. Users are looking for vendors who can meet their upgrade needs and be stable suppliers in the future.

- Supplies, which will account for 5% of the average DP budget this year, may see some price increases -- mainly because of rising paper costs -- and shortages may cause occasional problems.

- Services, including "total solutions," timesharing and keypunching, will account for another 4% of the $20.2 billion total.

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USER SPENDING BY MAJOR CATEGORIES ($ MILLIONS)

	1972	% /	1973	% /	1974
System Hardware	6,362	11	7,075	12	7,952
Support Hardware	1,380	20	1,662	25	2,071
Software (outside)	183	31	239	47	352
Services (EDP users)	590	18	696	19	828
Supplies	706	12/5	826	9/3	925
Total Outside Budget	9,221	14	10,498	16	12,128

(Slashed entries indicate "real" growth/price increases)

- Custom and packaged software from outside vendors will consume 2% of 1974's DP dollars. Most of this will go to supplement in-house software development.

The bulk of mainframe spending will go for large systems -- following the trend toward centralization as users take advantage of the economies offered by big machines. As far as orders are concerned, any tapering off will most probably show up in the last quarter if a slowdown in manufacturing seems to be leading to reduced inventories -- and thus dimmer business prospects -- for 1975. By that time many users will already be looking forward to the end of the 370 product cycle and beginning to mark time until the next generation is introduced.

The embattled PCMs

Users' plans suggest a healthy growth in demand for low-cost PCM peripherals and replacement memories this year -- but the continued viability of the plug compatible vendors is by no means assured, despite the triumph of Telex last November. Many PCMs -- especially those with no other major sources of revenue and a high percentage of rental customers -- are suffering as ever from chronic shortages of cash to pay initial manufacturing and development costs. Older PCM products designed for the 360 family are now obsolescent and rapidly losing value. These companies will need to show significant profitability from a healthy mix of cash-on-the-line OEM customers if they're going to be able to keep developing state-of-the-art equipment for rent. On the other hand, PCMs that manage to show early profits stand to do well.

Currently, 3330 disk drive replacements are the leading sources of PCM revenue and they should stay up front through 1974. Shipments of 3420 tape drives, another popular PCM item, will probably peak this year, the IDC study indicated.

The past year saw the introduction of several high-performance 370 add-on memory products, both semiconductor and core, as well as some new products designed to extend the lifespans of older 360s. By allowing users to add more memory than IBM offers, independents such as Cambridge Memories hope to persuade 360 owners to hold on to their aging CPUs a little longer. Signs are that business will be brisk — at least for the 370 add-on versions.

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U.S. - COMPUTER SYSTEMS HARDWARE ($ MILLIONS)					
	1972	% Δ	1973	% Δ	1974
System Rentals	3,382	5	3,550	6/2	3,834
Indep. Per. Mnfr.: rentals	159	27	203	25	253
Third Party Leasing: payments	697	14	792	10	870
Purchases: Gp. A&B	1,654	19	1,973	17	2,314
Maintenance: Gp. A&B	470	19	557	22	681
Total EDP Systems	6,362	11	7,075	12	7,952

The leasing market

Revenues from the sizeable base of 360s still under third party lease ($2.7 billion installed) will continue declining steadily during 1974, dropping 13% from $431 million to $377 million. But 370 leasing -- already amounting to an installed base of $1 billion including PCM equipment -- will keep up its surprisingly strong growth. Revenues from 370 leases -- mostly long term or full payout this time around -- will grow from $221 million to $314 million this year, IDC's estimates indicate. All computer leases, including equipment from non-IBM manufacturers, should add up to revenues of nearly $900 million for the leasing industry.

Meanwhile, a thriving market in used computers has sprung up. Among the newest used computer brokers is Itel Corp., which recently announced it will buy up used 370/155 or larger systems and resell them at "stabilized," i.e. high, prices. On the other hand, Itel was one of two large 360 lessors that recently decided to abandon their portfolios of leased second generation computers in favor of more profitable ventures. But other firms, such as Greyhound Computer, are hot-rodding their old machines with CPU accelerators, extended memories and other gadgets designed to keep users interested.

Communications shows strongest growth

The dramatic growth of teleprocessing will mean strong demand for various kinds of communications hardware and common carrier services this year. Remote terminals will be selling like hotcakes -- and sales of controllers, multiplexers and modems will jump 46%. How much of this market the independents will be able to keep is uncertain, now that AT&T, IBM and the other mainframers are taking a strong interest in this lucrative subsector. Total revenues from sales of communications equipment, excluding terminals, is expected to reach $477 million.

Common carrier line costs for computer-related communications will pass the $1 billion mark this year -- and most of it will go directly into the coffers of Ma Bell, despite the determined efforts of the new specialized common carriers to cream off leased line business with lower rates and better service. Meanwhile the hardware manufacturers are trying to cream off some of these dollars for

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themselves by offering systems that make more efficient use of communications channels -- such as IBM's Synchronous Data Link Control, which doubles channel use on full duplex lines for a mere 10% increase in cost.

Moving to shared processors

Spending for data entry equipment will grow an estimated 14% to $503 million this year. Outlays for disk-based shared processors are expected to jump 74%, resulting in a 17% share of the data entry market by yearend. Buffered keypunches will continue to be in good demand with sales increasing 17% -- and these devices will keep their strong dominance in the data entry sector. Other kinds of data entry equipment will see declining sales, with unbuffered keypunches dropping from 26% to 22% of the market and key to tape purchases falling to a mere 6%. Optical character readers and magnetic ink character readers also will show a drop in volume, declining to 11% of the market.

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Hospital survey

HOSPITALS SHOW GOOD POTENTIAL FOR EDP GROWTH
MANY ARE TURNING TO LOCAL TERMINALS FOR DATA CAPTURE AND INQUIRY

The appearance of several system packages for hospital data processing and information management last year -- including even a terminal from NCR designed especially for nurses stations -- suggests that many DP vendors are getting ready to zero in on the hospital market during the next few years. And a recent study of data processing in U.S. hospitals by International Data Corp. indicates that manufacturers have good reason to see a potentially rich market in this steadily growing subsector.

Hospital expenses totaled more than $32 billion in 1972 and U.S. citizens are spending more each year on medical care — an indispensible service for which demand doesn't slacken even when the economy is slowing down in other areas. And hospital operations are naturally suited in many ways to computer applications because of their needs for fast, precise information handling in big volumes.

Despite strong motives to automate nearly all phases of operation -- from general accounting to sophisticated diagnostic and medical monitoring functions — hospitals have been "late bloomers" in data processing. Today, most hospitals are relying on relatively small, unsophisticated -- and inexpensive -- systems to meet their needs. But they are also beginning to look enthusiastically at broader applications and in-house terminal networks to solve their DP problems more efficiently.

Hospitals surveyed by IDC indicated they will increase spending for mainframes by 22% in 1974 and terminal outlays will jump by a factor of four or five. Cost squeezing and the energy crisis will force most medical institutions to put off installing "total systems" in the immediate future, but there's plenty of room for expansion in the more traditional application areas.

Small machines predominate

An analysis of the IDC Data File showed the average hospital DP site has about 1.3 CPUs, noticeably below the 1.55 average for all sites. Just as significantly, the average value of hospital systems on file was only $330,000, well

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EDP Investments at U.S. Hospitals
Source: IDC's 6/73 Domestic Data File

EDP Investment Class[a]	*Equivalent Monthly Rental*	*No. Sites*	*% Total*	*No. CPUs*	*% Total*	*EDP $M Value*	*% Total*
<$500,000	<$10,000	531	71.6%	613	63.6%	$100.4	31.4%
$500,001 to $1,000,000	$10,001 to $20,000	140	18.9	187	19.5	97.1	30.3
$1,000,001 to $2,000,000	$20,001 to $40,000	53	7.1	115	11.9	71.2	22.3
$2,000,001 to $4,000,000	$40,001 to $80,000	15	2.0	38	3.9	37.6	11.7
$4,000,001 to $8,000,000	$80,001 to $160,000	3	0.4	11	1.1	13.8	4.3
>$8,000,001	>$160,001	–	–	–	–	–	–
TOTAL		742	100.0%	964	100.0%	$320.1	100.0%

[a]Total site value expressed in equivalent purchase dollars.

under the average $500,000 purchase value of computers overall. Hospitals accounted for 2.4% of all the systems in use, but only 1.5% of the dollar value. More than 80% of hospital sites have equipment worth less than $1 million.

Although many industry sectors are moving strongly into mainframe purchases these days, the hospital market has been -- and will remain -- a rental market. The only significant change in this pattern is likely to be a trend toward third party leasing as hospitals become more conscious of the cost advantages leasing offers.

The overwhelming majority of hospital applications in use today are general accounting functions such as patient billing, payroll, patient records and insurance. About 15% of the hospitals surveyed by IDC said they also use computers for clinical research. But almost all hospitals look toward the long-term goal of computerizing almost all information handling -- including on-line management of laboratory testing, patient monitoring, medication orders and critical diagnostic applications. Terminals located throughout each hospital will bring on-line diagnostics, patient histories and medical libraries right to the patient's bedside.

Much of the growth anticipated in U.S. hospitals will come from small institutions where EDP is still embryonic. Larger institutions, where EDP operations are already well established and running efficiently, will see far less expansion of basic DP applications. On the other hand, these hospitals are ready to begin implementing advanced total systems -- as soon as the new packages and equipment can be tested and proven for cost-effectiveness.

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• SPERRY UNIVAC, FOLLOWING THE LEAD OF IBM and Honeywell, has filed a "pre-notification of intent" with the IRS to raise rental prices on its systems and equipment an average of 2%. If the government approves the "cost of living" price hike, maintenance services and purchase prices will rise 5% on Univac systems. The number one and two mainframers have already raised prices an average of 2% across the board.

• RCA HAS INTRODUCED A TWO-CHIP CMOS MICROPROCESSOR capable of operating at low power in noisy, hot environments -- under the hood of an automobile, for instance. Incorporating 6,000 devices, the microprocessor can be connected to a mixture of random access and read-only memory and to peripheral devices, RCA says. The CPU chips will perform a fetch-execute cycle in 6 microseconds when connected to 1 microsecond RAM. Prices haven't been announced and the chips will be available to manufacturers only on a "sampling" basis this year, but RCA sees potential for the device in process control, POS terminals and programmable calculators, among other high-volume applications. The company says it has developed a software support system for assembling and testing programs.

• INSURANCE AND SALES REPRESENTATIVES anxious to make a big impression on prospective customers may be interested in a new portable printer-terminal from NCR. The 260-5 weighs 30 pounds and includes battery, acoustic coupler, modem keyboard and non-impact thermal printer. A salesman or broker can use the terminal to enter data or make inquiries to a distant computer from any location equipped with a telephone. Like preceding members of the 260 terminal family the 260-5 uses a silent printer that forms characters on heat-sensitive paper at up to 30 cps. The portable terminals rent for $110 a month on a three-year contract and will be available this spring.

• UNIVAC'S POINT-OF-SALE SYSTEM FOR SUPERMARKETS -- picked up from RCA last August and refitted to read the Universal Product Code a month later -- got its first "live" demonstration in a real supermarket this week. Now dubbed "Accuscan," the system ran through its paces at a one-checkstand installation in Framingham, MA. A full scale system will be installed by May and fitted with laser scanners by next fall.

Pilot Accuscan systems -- supervised by dual minicomputers -- include scanners, checkstands, keyboards, cash dispensers and label printers. Univac plans to drop the checkstand from its offering after the one-year pilot leasing program ends, leaving the system with essentially the same components as the IBM 3660 system due later this year. Univac seems to have a head start in this explosive market -- but the IBM system should be ready and waiting by the time Univac's first pilot leases are expiring.

• CAMBRIDGE MEMORIES PROMISES TO SPEED UP IBM 370/155s with a new processor accelerator available as an option with it 155 add-on memories. CMI claims its hardware accelerator increases processor speed up to 28% -- the equivalent of a 158 processor operating without virtual storage.

• THE KEY-TO-DISK SHARED PROCESSOR systems Univac recently contracted to buy from Pertec have been dubbed Univac 1900s and will be available this spring. The new data entry systems offer up to 18 megabytes of disk storage and as many as 32 formatting levels for each of 1 to 32 operator stations. Equipped with extensive checking facilities, the 1900 costs $1840 to $1970/mo. for 12 stations.

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MAR 22 1974

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 18,1974 • VOL.9,NO.11 P.J.McGOVERN,PUBLISHER

Telex wants original damages restored -- page 6

THIRD-PARTY LEASING INDUSTRY UNDERGOES RADICAL CHANGE AS NEW TYPES OF CONTRACTS EMERGE, SYSTEM/370 LEASE BASE HITS $1 BILLION

Surprising strength in the 370 leasing market -- coupled with a continuing erosion of the massive 360 base and some intriguing plans for the future -- are turning up these days in the third-party leasing industry . . . a business that has grown a lot more conservative during the last few years. But it's still an environment in which free-wheeling imagination can profit under IBM's umbrella.

Indeed, despite IBM pricing moves such as unbundling, FTP, ETP, and "high" prices for 370 . . . and their impact, including almost disastrous consequences for some unwary 360 lessors . . . many lessors and leasing agents seem confident they can afford to undercut IBM rates on 370 equipment. Plenty of users already have shown willingness to commit to long-term contracts that mean lower prices. And there seems to be no shortage of investors willing to back the deals -- sometimes simply to win a tax break. All this adds up to a prospering business.

In its survey of user spending plans last December, the International Data Corp. found the following prospects for the leasing industry during 1974:

- The base of 370s on third-party lease has passed the $1 billion mark. Total revenues from payments on these leases will grow 40% to $314 million this year.

- Payments on leased 360s will continue their steady decline, falling 13% from $431 million to $377 million. The base of 360 equipment on third-party lease amounts to $2.74 billion at original cost, but has been depreciated to well under half this value.

- The renewal market for 360 CPUs coming off lease is holding up fairly well, though many lessors are accumulating inventories of surplus peripheral equipment.

- Overall, payments for leased computer equipment -- including non-IBM mainframes and peripherals -- will grow 10% to $870 million this year. According to IDC's estimates, this compares to a 14% growth rate last year (see page 4).

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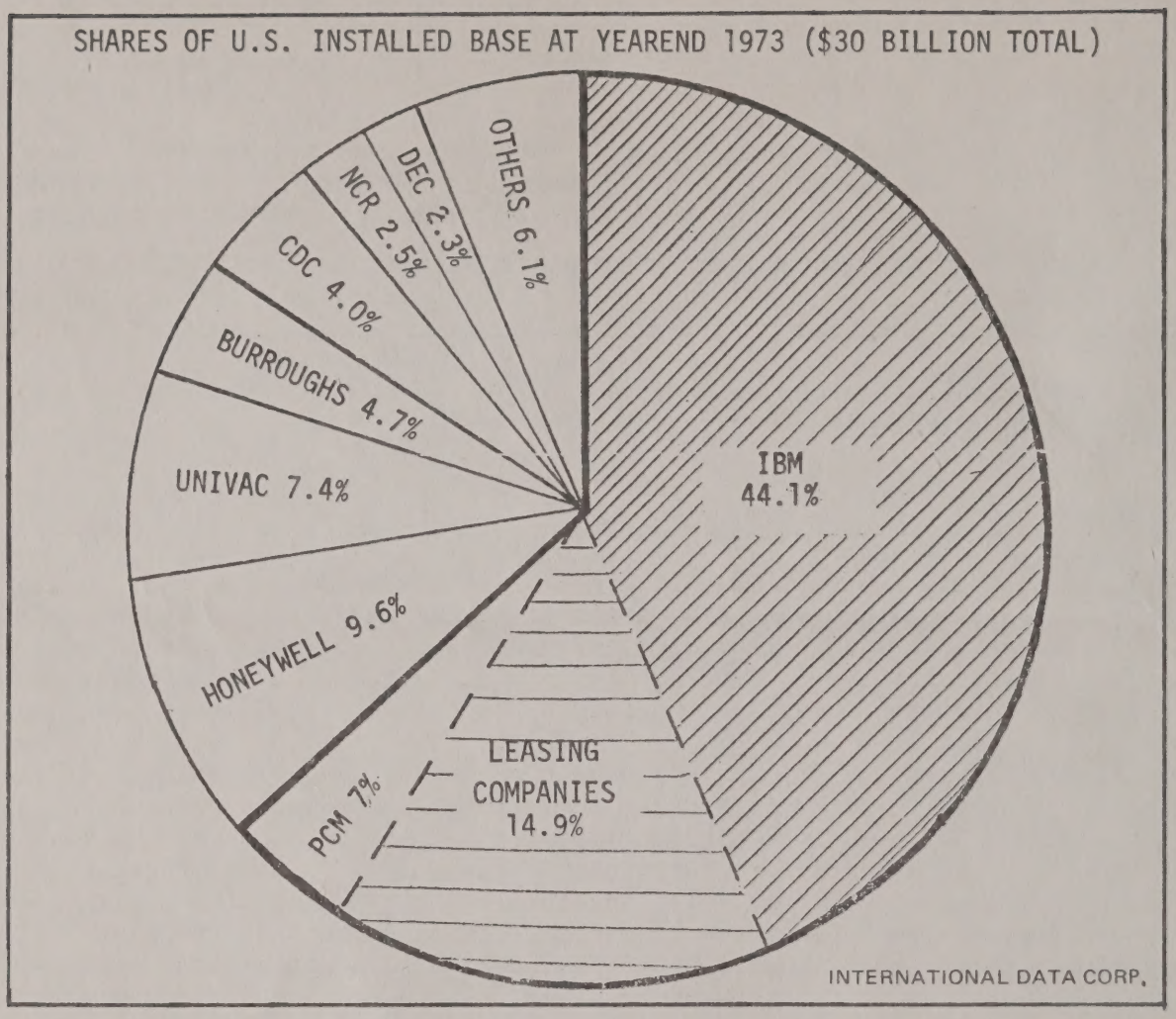

Underlying this slow but steady growth in the leasing industry has been a process of metamorphosis in reverse -- from butterfly to caterpillar, so to speak -- since the happy-go-lucky days of the 1960s, when it looked as though anyone with financial backing and a book of order blanks could jump aboard the 360 roller coaster. Not that the risks weren't clear even then -- prospectuses bristled with warnings to investors that the fate of the leasing business turned on the whims of IBM -- but the potential profits seemed enough to draw legions of backers.

Today the game is continuing, but with an altered field of players and a new set of rules. Many 360 lessors beat a retreat when the higher-priced 370s were introduced. Some were foundering in red ink and couldn't raise capital to finance new portfolios; some took one look at the new family and decided it was merely an interim offering anyway; some decided to try other lines of business. But a few of the survivors, notably Itel and Leasco, plunged ahead -- and quite a few large financial institutions have entered the field.

Far more conservative accounting, financing and marketing practices are the hallmarks of the transformed computer leasing industry:

- Short-term third-party leases are a thing of the past. Most users must commit themselves for at least five years to win significant cost advantages on 370s; during 1974 many lessors will stop writing even five-year operating leases and deal only in full-payout packages.

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- Lessors are depreciating 370 equipment over an expected useful lifespan of eight years or so instead of the unrealistic ten to twelve years most lessors counted on for the 360 generation.

- Financially sophisticated firms with experience in computer leasing are turning to lease packaging, lease brokering or "agency" leasing -- arranging contracts between users and investors on a fee basis and avoiding direct ownership of large mainframe portfolios.

Probably the prime example of the new breed of leasing companies is an old leasing company -- Itel Corp. -- which was an early high-flyer in the 360 leasing business. Itel took its losses, revamped its philosophy and has bounced back to become the largest manager of leases on 370 equipment -- $300 million worth so far, of which about a third is plug-compatible equipment including memory units from AMS and disk drives from its former manufacturing subsidiary, ISS. Richard Lussier, president of Itel Data Products, expects these bookings to double to $600 million by yearend 1975.

In making the jump from 360 to 370 leasing, Itel has transformed itself from an owner/lessor of computing equipment into a "financial and business services" organization. The company lines up lessees, packages leases combining IBM CPUs with Itel peripherals, and finally finds investors and lenders to finance the deals.

Aside from its overhead, Itel invests no money in these fine-tuned financial packages. As the lease manager, it collects a percentage of all lease payments as a fee and takes a share of residual value of the equipment at the end of its leasing life. The leases also are vehicles for the sale of the compatible peripherals Itel markets -- but no longer manufactures. Thus Itel has largely removed itself from the arena of risk, but still makes money from its financial expertise.

Computers as tax shelters

To help make computer leases attractive to investors, Itel has specialized in "tax-leveraged" deals that give high-bracket backers the benefit of the Job Development Tax Credit and other tax allowances on rapidly depreciated equipment. These investors -- who become the legal owners and lessors of the systems -- can get the full tax credit by putting up about a third of the cost of the systems as equity. The rest of the money is borrowed from lenders -- and the investors take another tax credit on the interest they pay. Sound complicated? It is -- and Itel is hoping its competitors will have a hard time figuring out the combination. You might call it fifth party leasing . . .

The upshot of all this finagling can be considerable savings to users, since tax leveraging actually turns to advantage the high rate of depreciation that caught 360 lessors in a bind. Lussier says Itel lease rates are typically equivalent to payments on a financed purchase at interest of only 5% to 6%.

How long will 370 last?

The economic lifespan of the 370 family is one of the biggest questions confronting the leasing industry. Every lessor is prepared to see IBM introduce a new and possibly very different family of systems by 1977 -- but they differ widely in their views of the impact FS is likely to make on the market. Itel spokesmen point out that users are just beginning to use virtual storage and counts the introduction of VS as the start of a new IBM product cycle -- betting that IBM won't

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COMPUTER SYSTEM THIRD PARTY LEASING - U.S. ANNUAL PAYMENTS

	1972 $M	%Δ	1973 $M	%Δ	1974 $M
System/360	498	(13)	431	(13)	377
System/370	98	125	221	42	314
All Other Systems	101	39	140	28	179
TOTAL	697	14	792	10	870

take serious steps to obsolete VS equipment much before the end of the decade. "The U.S. will provide systems growth for the indefinite future," says Lussier. "The installed base will stay viable for a long time no matter what FS looks like." The point is important to lessors not only because they will need to extend or release many of their current contracts in order to recoup their investments, but because most have a stake in the residual value of their equipment. Generally they assume the equipment will really be worth quite a bit more at the end of their payout periods than the minimal salvage value they've allowed for auditing purposes.

Another major unknown in the future of leasing is the fate of tax shelters. The Job Development Tax Credit and other provisions played little part in the 360 leasing market, but 370 leasing might never have gotten off the ground without the tax angle to play upon. Lessors who don't offer tax allowances to attract cheap equity capital -- yielding feasible lease rates -- usually pass the tax credit along to the lessee to make higher lease rates easy to swallow. A high bracket user who can take the full tax allowance on his leased system can subtract as much as 30% of the cost of a short-term lease (three to five years) from his tax bill.

As usual, legislation is pending before Congress to eliminate these credits -- especially on not-for-profit investments. Passage of such a measure could bring a sudden end to tax-leveraged leasing. Leases already written probably wouldn't be affected -- most of the allowance is taken in the first year -- but new leases would cost a good deal more. But Itel, for one, claims not to be too concerned. Like the other lessors, Itel is convinced the broad IBM umbrella -- for all its leaky holes -- will always provide room for profitable leasing deals.

Keeping the 360 afloat

Meanwhile . . . surviving 360 lessors are battling to keep their 3,000 remaining systems out on lease at rates above the starvation level. Some have already retired from the field -- Dearborn-Storm sold its portfolio to a group of private investors this month and took a $13 million loss; Itel has stopped writing leases on its $217 portfolio and plans to offer its machines for sale to their current users for little more than the price of a short lease extension. Boothe Computer Leasing, Wyly Corp. and most other major 360 lessors have been forced by their auditors and the hard realities of the 360 market to write down the book values of their portfolios significantly.

What happened? Those who fell hardest blame IBM and its unbundling, leasing plans, price cuts and new product introductions. But others say the leasing industry has been its own worst enemy -- unrealistic expectations and accounting practices plus poorly written leases brought on hard times . . . resulting in des-

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perate price cutting . . . and the weak dragged down the strong. But the thousands of leased and owned 360s still in the field represent a vast reservoir of useful computing power -- and lessors who managed to emerge in reasonable health believe the third generation still offers plenty of business opportunity.

One of the biggest 360 enthusiasts around these days is Olie Swanky, president of Greyhound Computer. His company bought a lot of 360 equipment early in the product cycle and claims to have made a profit every year out of the last eleven. Unlike many other leasing operators, Greyhound used its revenues to pay off its bank debts -- instead of diverting cash for expansion into other areas -- and has pulled through without a write-down on its portfolio. Now the company has enough 360s on long enough leases to see Greyhound out of the woods on its initial investment. What's more -- Greyhound is sitting out the 370 round and buying up more 360s!

Having acquired the inventories of three smaller 360 lessors in the past year, Greyhound apparently now owns the largest 360 portfolio -- $340 million worth at original list prices, including some plug compatible peripherals. The company currently carries the equipment at a book value of $132 million.

Did Greyhound cry "wolf?"

Greyhound's badly burned competitors look upon all this with understandable chagrin. It was Greyhound that shouted loudest and filed suit against IBM when the Giant unbundled and lowered prices. The suit was dismissed -- though Greyhound is now reappealing in the wake of the Telex decision -- but one competitor complains that Greyhound "cried wolf until the bottom dropped out of the 360 market" and now is stepping in to pick up the remains.

Most of Greyhound's machines are medium scale 360/30s and 40s and the company expects to make the support and upgrading of smaller users the mainstay of its business. The company offers system support, accelerated hardware and memories extended beyond IBM limits -- about 10% of its CPUs have been given the "Phoenix" overhaul demonstrated last May -- and other hand-holding services for customers. "We're not just filling orders," Swanky says.

At the same time Greyhound has been making aggressive moves into data processing services, setting up service centers around the country. Thus far, about 20 of the larger 360s in its inventory have been allocated to this effort.

Big plans for the future

The market for 360s, in any event, is plainly temporary. And Greyhound isn't planning to fade away with the end of the third generation. The firm skipped 370, viewing it as a short-term, high-cost offering, but already is making plans to dive deeply into "FS" when the new generation finally appears.

That kind of planning seems premature to most leasing outfits -- "I'll tell you the day it's announced whether it's leasable or not," one commented -- but Swanky is convinced the next family will be reasonably priced . . . by court order if necessary . . . and designed for the long run. He's also betting that IBM's FS systems will be applications oriented and will rely heavily on radical advances in software, communications and memory organization. And Greyhound plans to be ready when the time comes. The firm has taken over several small software outfits and put them to work developing expertise in specific application areas, such

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as life insurance and manufacturing, and expects to be Johnny-on-the-spot with specialized systems packages for lease very soon after the first FS equipment is delivered. Meanwhile, Greyhound figures, IBM will continue to be too busy trying to be all things to all men to worry about competition from applications specialists. To top it off, Swanky believes the FS leasing business will require too much technical know-how to be suitable for financiers -- eliminating competition from banks and investment groups.

It sounds like a grand scheme -- and Greyhound hopes it will convince users of its 360s to hang on until FS gets here. If Swanky's view of future is as clear as he believes, the computer leasing industry can look forward to even greater changes at the end of this decade than it saw in the beginning.

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From between the lines

A PARADOX IN THE THEORY OF FREE ENTERPRISE EMERGES IN TELEX/IBM APPEAL

Right on schedule, Telex last week filed its reply to IBM's appeal of Judge A. Sherman Christensen's ruling that called the Computer Giant a "monopolist" and predator in the plug-compatible market. Predictably, Telex argues that it should receive the original $350 million in damages it was awarded last Sept. 17 -- before the judge reduced the award to allow for the unfair advantage Telex allegedly got from stealing IBM trade secrets. The independent manufacturer denied again that the IBM employees it hired away had revealed any secrets -- and further argued that, under the so-called "dirty hands" rule, nothing Telex had done should affect its rights to damages.

So, it seems to EDP/IR, one of the prime issues facing the appeals court is IBM's proper role in the marketplace. Is IBM a "monopolist" under the terms of the Sherman Act? Was its behavior legitimate or predatory? Is the plug-compatible business even a "relevant market"? Judge Christensen has admitted that his interpretation of facts, and his ruling, is open to reasonable question.

Given the arguments by both sides, EDP/IR senses a paradox of sorts emerging from between the lines of the parties' appeal presentations. IBM maintains that its price cutting actions designed to maintain its dominant share of the peripheral market were legal because they still returned a "reasonable profit" to the company and were indeed the sort of competitive responses the Sherman Act was designed to ensure.

Telex, in its appeals brief, argues:

> A monopolist, by reason of its lower manufacturing costs, can always lower its prices and thereby provide, however temporarily, the end user with a lower price on the products affected. When a monopolist does this to drive out its competition, however, its conduct, in the context of the antitrust laws, should be measured in terms of its real motivation and not the incidental effect. . . . to properly measure such competitive pricing against the antitrust laws the courts must look not at the short-term benefit to the consumer but at the long-term likelihood that once the monopolist has eliminated its competition, it is therefore free from market constraints to do what it wishes with its prices, and accordingly, based upon past conduct, may raise them to an artificially high level.

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> In this case we do not have to speculate how IBM would price were its competition eliminated. We do not have to guess whether IBM would raise its prices and obtain exorbitant profits on its peripheral products were there no competition. We do not have to guess on that because when IBM was enjoying its monopoly power unfettered and unthreatened by competition from companies like Telex it priced its peripherals at exorbitant levels and had done so for many years. Indeed, it was this IBM "price umbrella" that permitted IBM to lower its prices drastically and still price at a level that it now characterizes as providing it with a "reasonable profit." . . . It must be concluded that if IBM could drastically reduce its prices and still price at a "reasonable profit," then it was pricing at an unreasonable profit while its monopoly power was unchallenged.

This argument by Telex, it appears to EDP/IR, results into an irresolvable dilemma: It implies that the plug compatible manufacturers can exist only under an "umbrella" of "exorbitant" IBM prices; as soon as IBM is forced to price reasonably and put some effort into technological innovation, the PCM market disappears as a viable enterprise. Thus, the PCM market appears to be a creature of IBM monopoly and that -- within any traditional model of free enterprise economy like the one the Sherman Act assumes -- is a paradox.

One of the Sherman Act assumptions is that if a market exists, no single competitor will be able to control its prices indefinitely unless it keeps prices at a reasonable level, shows superior "industry, skill and foresight" or holds a legal patent or exclusive right to compete.

So, as the theory goes, if there is a distinct market for IBM-compatible peripherals, then companies that price reasonably and exhibit "industry, skill and foresight" should be able to compete in it. And they did . . . and the court decided there is such a market. But the Telex argument now suggests that this PCM market had, at best, an artificial existence and thrived only in the hothouse environment created by IBM's overconfidence and unrestrained pricing policies.

The long-term viability of this market theory has not been tested. No one knows what would happen if a company legitimately entered a plug-compatible market sector near the beginning of a product's life cycle . . . and had the financial backing to compete vigourously; there have been only a few, non-conclusive tests (double-density disk drives, for example) of products equivalent or superior in price/performance but not identical to those introduced by IBM. So the marketplace doesn't currently hold the answer.

And in the courts, the arguments seem to be zeroing in on the area Judge Christensen himself says is open to some differences of opinion. The quandary seems to be as follows:

> *If the PCMs exist, then IBM will price reasonably . . . but if IBM prices reasonably, the PCMs cannot exist . . . and if the PCM's do not exist, then IBM will not price reasonably.*

Damages and trade secret theft aside, the overriding question in Telex/IBM seems to be that of market definition. And before the current round of legal entanglements in the computer industry is resolved, EDP/IR suspects some new, up-to-date theories of antitrust law will have to be adopted. These could come from the courts, in evolutionary fashion . . . perhaps, though, the computer industry provides an excellent opportunity for lawmakers to think about the law.

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• DID IBM INFRINGE PATENTS WHEN IT INTRODUCED such basic functions as cache memory and virtual storage? In a suit filed in Illinois federal district court this month, Bunker Ramo claims it did. The suit demands triple damages for IBM's alleged infringement of seven patents covering "computer control and display apparatus, as well as memory and memory transfer apparatus used in IBM System 360 and 370 and in the 2250 display." No dollar amounts were set on the claim, but BR said they would be "substantial."

In a brief public statement, IBM dismissed the claim and denied infringing any patents. The Giant has been using some of the devices in question for years and claims BR never protested before. But BR says it has raised the patent issue repeatedly behind the scenes -- and now is filing suit only because it has given up hope of reaching a settlement. Some of the patents cover devices BR developed and manufactured for classified military projects during the 1960s, though the company's primary line of business is now computer services.

• HONEYWELL SAYS ITS BOOKINGS OF LARGE-SCALE Series 6000 computers have pushed past the $1 billion mark. Orders for the big communications oriented systems were stronger during 1973 than in any year since the family was introduced early in 1971, according to Honeywell spokesmen. Yearend estimates by International Data Corp. put the number of 6000s shipped so far at 350, worth $650 million.

• IBM HAS EASED THE WAY FOR SYSTEM/3 USERS who want to use their Model 6 or Model 10 disk systems as remote batch terminals. Two new operating system features, available free, allow local jobs too large or complex to run on the System/3 to be entered via the small computer, processed by a remote 370, then returned to the source. The new remote features follow on the heels of other programs designed to make System/3 easier to use in on-line interactive applications with 3270 CRTs.

Control Data, meanwhile, has unveiled a new remote batch terminal of its own that can emulate the IBM 2780 as well as support CDC's Cyber 70, 6000 and 3000 systems. Heart of the new CDC 734 is a 16K byte controller to which various I/O devices can be connected at the user's option. A typical configuration with a low-speed printer and card reader costs about $27,000 -- slightly more than the IBM 2780 compatible version.

• CDC -- ALREADY THE LARGEST INDEPENDENT peripheral manufacturer -- extended its reach into the plug-compatible market still further this month with the purchase of a 370 semiconductor memory lease base from Memory Technology. CDC will provide field service for all MTI memories and market new units under a non-exclusive agreement. With MTI acting as one of its suppliers, CDC plans to offer a complete line of add-on memories for 370/135s up to 168s.

• OPENING WHAT COULD BE A WHOLE NEW ROUND of anti-trust litigation, MCI Communications Corp. has filed a civil suit charging AT&T with monopolizing the data and business communications market in violation of the Sherman Act. MCI did not dispute the legality of Ma Bell's regulated monopoly on local telephone service -- but claimed the communications giant has taken advantage of its control over local exchanges to illegally monopolize long-distance communications. MCI's suit is the latest step in its long struggle to wrest a piece of the leased private line market from Ma Bell's grip. First of the specialized common carriers, MCI was authorized to compete in this sector by the FCC in 1971.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 27,1974 • VOL.9,NO.12 P.J.McGOVERN,PUBLISHER

Other carriers cry "monopoly"

AT&T FILES TARIFFS FOR DATA-PHONE DIGITAL SERVICE; NEW OFFERING PROMISES BETTER RELIABILITY AT LOWER RATES

In a well-publicized announcement last week, AT&T finalized rates and regulations for the long-awaited Data-Phone Digital Service (DDS) and submitted them for FCC approval. It sounded almost as if "Mother" Bell was courting her favorite child, the user, to protect his ears from protests by competitors in the courts and before the regulatory agencies. The speeches and press releases were low-key and dowager-like; the rate schedules were eloquent. Both were plenty to trigger some pleased reactions from customers and more cries of "monopoly" from competitors.

DDS -- as the new offering is to be called -- was described by its parent as a "major step in the evolution of data communications." For the first time, it offers computer and terminal users the capacity and reliability of all-digital transmission over long distances, the reliability of automatic back-up circuits, and rates far below the cost of transmission over modulated voice channels. Within 60 days after the FCC approves the tariffs, DDS will be available in five major cities -- Boston, New York, Philadelphia, Chicago, and Washington, D.C. -- and in 24 cities coast-to-coast by the end of the year (see page 2).

Bell said it will offer the service to both end users and the new "composite common carriers" -- apparently the latest name for the packet-switched and other types of value-added network services (EDP/IR Dec.6,1973). Also, AT&T confirmed that, if the FCC approves its current filing, these specialized carriers will get identical rates. To many observers, all this looked like a squeeze for MCI and a potential death blow to financially troubled Datran Inc., which for several years has been trying to institute an all-digital network.

With last week's filing, AT&T took a step that it's been moving toward for more than a decade. Bell operating companies began installing digital-voice circuits within cities during the 1960s; the system now incorporates more than 25 million voice channel/miles of digital circuits.

But AT&T says it was not until it had completed a major study of the market in 1970 that the demand for long distance data communications seemed enough to justify plans for inter-city digital links devoted to data. In 1971 -- two years after Datran announced its plans to build a commercial digital network -- AT&T

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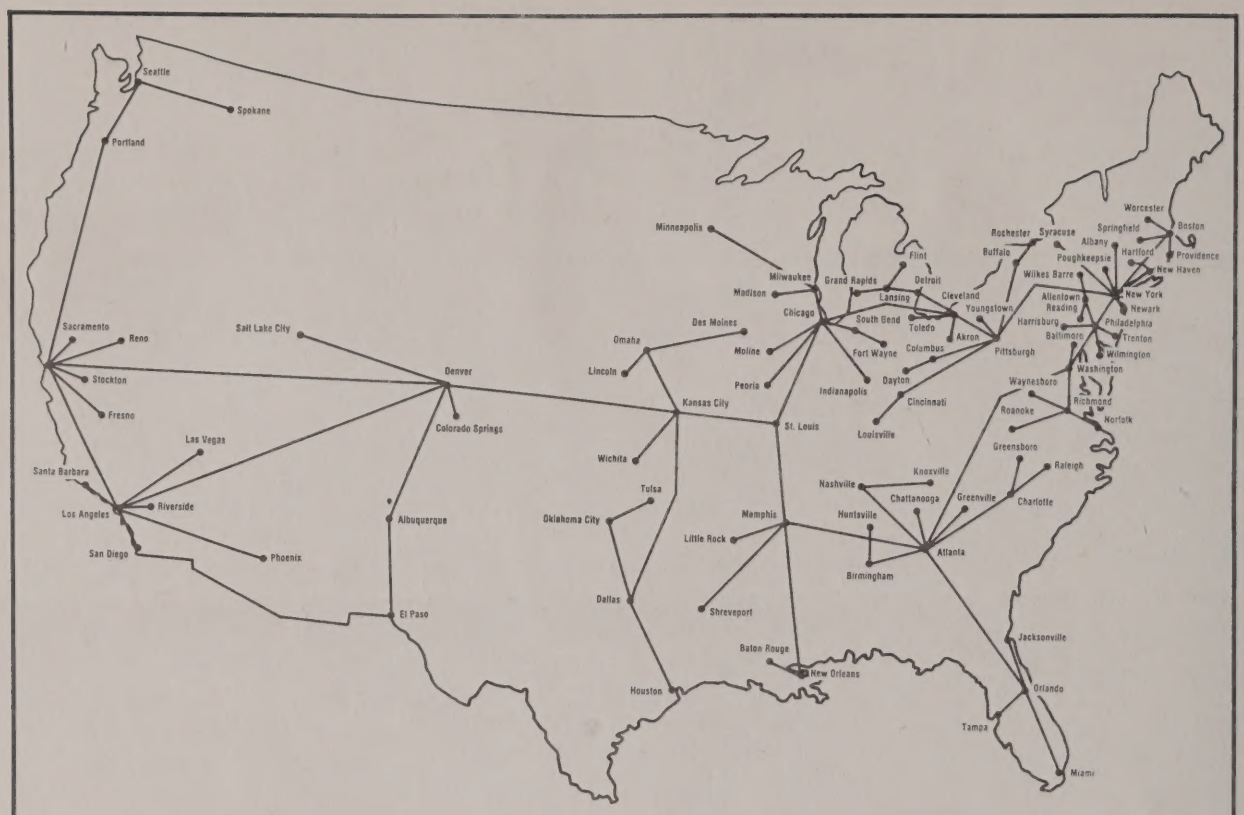

BELL'S DIGITAL DATA SERVICE WILL EXTEND TO 96 CITIES BY 1976

unveiled Data-Under-Voice (DUV), a technique that allows unused portions of the microwave spectrum to carry digital signals without adding new channel capacity -- let alone new central offices, towers and antennas. Now the communications giant is ready to use DUV to supply the cheapest data transmission yet.

Who's really paying?

In a prepared statement issued shortly after Bell's March 20th announcement, Datran President Glen Penniston said his company opposes any FCC approval of DDS because the service could have "unfair and anti-competitive implications."

Specifically, he pointed out that while Datran has built a data-only network from scratch, AT&T has merely modified facilities already constructed to serve the voice transmission market. And AT&T holds a legal monopoly over that market. So, if in setting rates for DDS Bell has taken into account only the "incremental" costs of adding DDS to existing facilities, Datran reasons, then the giant in effect is "subsidizing" the new service with its -- and the public's -- investment in voice facilities. Datran claims that AT&T can only be competing fairly if it "fully allocates" all costs of the network among all users.

Datran said it will take "appropriate steps" to oppose any "predatory" tactics by AT&T if its analysis of the giant's filing seems to indicate that the proposed rates for DDS involve cross-subsidizing with its voice facilities. On the other hand . . . leaving the back door open for a gracious retreat if necessary . . . Datran said it will welcome DDS as an industry stimulus if the offering seems straightforwardly competitive.

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Another onlooker that's casting a jaundiced eye on DDS is MCI Communications Inc., AT&T's most aggressive competitor among the specialized common carriers in the private line market. MCI -- which just won a major court confrontation with AT&T last month over interconnection rights -- competes directly with AT&T Long Lines for private line business. Twenty percent of its business is data carriage. An MCI spokesman said Ma Bell's DDS rates for a 4800 bps line -- $40 per month plus 60 cents per airline mile -- undercut MCI prices by 40%. MCI called this "a clear case of predatory pricing."

AT&T spokesmen are reluctant to respond to these suspicions point by point, but one executive claimed that some methods of costing DDS on a fully allocated basis resulted in even lower rates than the "long-range incremental" method. In any case, DDS has been priced to return a considerably higher profit than the FCC will allow Bell to keep on its total business, meaning that the surplus will wind up supporting voice services, Bell claims.

Whether or not it can support its anti-competitive charges, Datran isn't ready to throw in the towel. The company began service between Dallas and Houston in December and now is finishing its first interstate link to St. Louis via Tulsa and Oklahoma City. It won't have to file rates with the FCC until that link is ready -- and figures it can gear its rates to compete with AT&T's. "I suspect we'll be able to live with the AT&T tariffs," said one Datran spokesman. "At the moment we aren't serving the same regions anyway." Nevertheless . . . Datran is short of financing and hasn't found any new backers since a Swiss investor kicked in $20 million last fall. The company admits it needs twice as much again to get its interstate network going.

Fast-growing market

The impetus behind all this infighting is the phenomenally growing data tranmission market. AT&T says the demand for data services has been growing by 40% a year or so for the past few years and should keep expanding at that rate at least through 1976 -- as far ahead as it has projected. By the end of 1976 Bell Long Lines expects to be taking in $116 million a year from DDS revenues alone, a projection based on the rate at which demand is growing plus a conservative 5% "stimulation factor" to allow for the accelerating effects of cheaper and more reliable service.

AT&T market analysts point to considerable recent growth in timesharing services and the new opportunities for small users with terminal-to-terminal requirements as important factors in the booming market.

Recent surveys by International Data Corp., publisher of EDP/IR, indicate a far larger overall market for data transmission services when the remaining analog sector is added in. IDC estimates that total payments for data transmission lines will pass the $1 billion mark this year, rising more than 20% over last year's $900 million user spending.

Impact on the VANs

The availability of DDS won't help the specialized common carriers, but the nascent packet switched networks now under development by Packet Communications Inc. and Telenet Communications Corp. have been counting on digital service to improve the data transmission offerings they're planning. Both these carriers intend to lease high-capacity intercity circuits for their networks.

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GENERAL-PURPOSE COMPUTERS IN U.S. SUPPORTING COMMUNICATIONS, 1973-1977
(Estimates and Forecasts Copyright 1974 by International Data Corporation)

Size Class Monthly Rental	1973 Total #	1973 Total $B	1973 w. Comm. #	1973 w. Comm. $B	1977 Total #	1977 Total $B	1977 w. Comm. #	1977 w. Comm. $B
SMALL: Below $2,500	29,000	2.9	3,600	0.4	59,000	4.5	9,200	0.7
MEDIUM $2,500-$10,000	16,000	3.8	2,880	0.7	26,000	5.2	7,000	1.4
LARGE $10,000-$40,000	14,000	11.6	8,470	7.0	16,000	12.7	14,000	11.1
VERY LARGE Over $40,000	3,000	9.0	2,550	7.7	5,000	15.8	4,800	15.2
TOTALS.....	62,000	27.3	17,500	15.8	106,000	38.2	35,000	28.4

In one sense, of course, DDS will be competing with their value-added services, since the availability of a reasonably reliable data service from Ma Bell may lead some users to decide they don't need packet switching. Error rates on current analog circuits are high -- on the order of one bit per 100,000 -- and DDS is expected to reduce that rate by a factor of 100.

But most applications require still fewer errors, and the error correction techniques built into most packet switching networks better the accuracy of any transmission by several factors of 10 beyond whatever error rate is intrinsic to a given circuit. Furthermore, by concentrating data traffic on high-capacity links, packet switching is supposed to increase the efficiency of long distance transmission -- and thus cut costs -- no matter how low the cost of the circuit itself.

Indeed, the rates AT&T filed last week held a pleasant surprise for the VANs -- the tentative rate of $4.80 per mile for a 56 kilobit link proposed previously dropped to $4.00 in the final rate schedule, a boon that promises to allow the packet switched services to charge rates 10% lower than they'd counted on, according to a Telenet spokesman.

Moving to worldwide DDS

While U.S. carriers were accelerating their competition for data transmission business in this country, Western Union International, the third-largest intercontinental carrier, was making preparations to start the first worldwide digital data network. WUI reported "enthusiastic" responses from foreign representatives at a seminar it sponsored in February to discuss the need for international digital transmission services.

At the seminar -- which included representatives from ITT and RCA Global Communications Corp., WUI's major competitors -- WUI proposed a dual path network using simultaneous cable-satellite transoceanic channels to overcome the serious reliability problems that plague intercontinental transmissions. The company says it is ready to institute service "tomorrow" on its own links -- but arrangements must first be made with the individual nations served by WUI's network.

Major cities in Britain, France, Italy and Spain are already equipped with the local digital circuits necessary for interconnection to an international digital network, a WUI spokesman said, and service could begin to these cities as early as six months from now once rates and regulations have been agreed upon.

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As EFTS gets closer

IDC STUDY SHOWS GOOD GROWTH FOR BANKING MARKET

U.S. commercial banks -- by far the richest group of financial institutions in the country and early leaders in the march to automation -- will continue to see healthy growth in their purchase and use of data processing equipment through 1974, according to a recent spending study and banking survey by International Data Corp., publisher of EDP/IR. What's more, new money transfer techniques will mean continued growth in the demand for both mainframes and terminals.

Spending by banks for computer systems, terminals, and independent peripherals will rise 15% over last year, the survey indicated, while outlays for data entry equipment will grow 19%. And the rapid growth of communications networks for remote data collection and centralized accounting is expected to push bank spending for communications equipment -- including modems, communications processors, and multiplexers, but excluding terminals -- a spectacular 60% above the 1973 level.

All this growth will occur on top of the banking industry's already heavy investment in data processing -- which includes an installed base of $1.5 billion in computing equipment, according to IDC estimates -- as banks lead the way toward the development of the most advanced and comprehensive "information utilities" services available.

Underlying these simple figures, however, is a DP market structure with a marked stratification and approaches to computer use that vary widely according to the size and aggressiveness of the banks concerned:

- As many as 80% of the nation's 14,000 commercial banks do not use an in-house computer system. And these institutions show little potential for first user sales in the currently uncertain period, since most are already locked in to outside arrangements for data processing services and automation.

- But the 50 largest banks -- representing a mere third of one percent of banks by number -- own a remarkable 50% or so of all bank assets. Indeed, 19 U.S. banks have in-house DP investments of more than $10 million each -- and the top 50 banks rent, lease or own more than a third by value of all bank DP systems and related equipment.

- These users of relatively large and elaborate systems are constantly expanding and increasing the sophistication of their applications, making them prime targets for vendors of mainframes, terminals, communications gear, and software.

Toward electronic money

Such heavy use of data processing in the banking industry got its big impetus from the cumbersome bookkeeping load of demand deposit accounting -- a consumer business that involves millions of small transactions every day with no transfer of tangible goods. In this major application -- still the most important in banking -- the almost universal use of batch processing methods is beginning to give way to on-line automatic systems that reduce errors, lessen cash float, and cut personnel costs.

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EDP Investments at U.S. Banks
Source: IDC's 6/73 Computer Installation Data File

EDP Investment Class[a]	*Equivalent Monthly Rental*	*No. Sites*	*% Total*	*No. CPUs*	*% Total*	*EDP $M Value*	*% Total*
<$500,000	< $ 10,000	607	45%	655	28%	$ 155	10%
$500,001 – $1,000,000	$ 10,001 – $ 20,000	341	26	453	19	227	15
$1,000,001 – $2,000,000	$ 20,001 – $ 40,000	195	15	414	17	269	17
$2,000,001 – $4,000,000	$ 40,001 – $ 80,000	110	8	322	14	296	19
$4,000,001 – $8,000,000	$ 80,001 – $160,000	50	4	260	11	273	18
>$8,000,001	>$160,001	24	2	261	11	323	21
Total		1,327	100%	2,365	100%	$1,543	100%

(a) Total site value expressed in equivalent purchase dollars.

Last summer IBM put its imprimatur on this idea with its teller-to-computer banking system -- due for first deliveries later this year (EDP/IR Aug.23,1973). Even more elaborate arrangements are in experimental use in some parts of the country. A complete "checkless, cashless" society is still a long way off, but the fundamental need for electronic funds transfer systems (EFTS) has been recognized. A few banks already are offering such services on a limited scale by allowing customers, for instance, to have money transferred from their own accounts to a merchant's account on-the-spot when they purchase something.

When these systems come into widespread use, banks will become the electronic clearing houses for virtually all the commercial transactions in their communities . . . providing central handling of cash transfers, savings, loans, billing, mortgaging, and credit verification. All this will require a lot of processing power, elaborate networks, and large data bases. It will also provide a natural path for the evolution of banking into the on-line information business . . . the autotransaction industry.

Obviously, a lot of basic changes will have to take place -- and a lot of problems will need solving -- before all this comes to pass; so it isn't easy to estimate how far in the future these innovations lie. But progress should be fairly steady from now on, spelling solid business for DP manufacturers.

Meanwhile, the continuing consolidation of consumer money management within banks is likely to be paralleled by a consolidation of banking assets into large institutions and bank holding companies -- following a trend that has been gathering momentum since the Bank Holding Company Act was passed in 1970. This

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law permits banks incorporated as holding companies to own financing and leasing operations, run data processing services, and possibly even to acquire savings and loan associations if the Federal Reserve Board agrees.

Slicing the pie

The major mainframers have shown strikingly varied success in the banking market. Burroughs is a marked "favorite" compared with its standing in other sectors -- nearly one in four computer systems at banking sites are Burroughs built, in contrast to its 4% share of the overall EDP market. This represents about 16% of the dollar value of installed banking computers.

NCR, predictably, is another favorite with 15% of the banking market; but as a vendor of primarily smaller machines, NCR's dollar share is only about 6%. Univac and Honeywell, though they've sold relatively few systems to bankers, have managed to install a number of large systems. So IBM's slice of the pie is its typical 70% of the dollar value.

In all, IDC estimates, banking computers represent about 7.5% by value of all computers used in the U.S., and account for some of the most advanced commercial applications. Copies of the full report are $395; write IDC.

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IBM ADDS 30 FIXED HEADS TO 'WINCHESTER' MODULES . . . THE "DRISK"?

When IBM one year ago announced the 3340 "Winchester" disk drive (EDP/IR Mar.19, 1973), our story indicated it was "A file to watch."

> *From the relative ease with which capacity already can be doubled . . . it looks to EDP/IR as if the 3340 is only the beginning of a new disk drive generation, comparable to the 2311 in its growth cycle. It simply doubles the recording density from the 3330 level . . .*

Now, just as the original 3340 and its 3348 disk pack is being delivered, IBM has up and put 30 fixed heads in the disk pack ("data module," in IBM parlance), so that one-half million bytes of information are available "to a computer with no time delay for positioning access arms. It also stores up to 69.3 million bytes served by moveable heads that operate with an average seek time of 25 millisec."

The result might be called a "drisk" . . . a disk with some drum-like features. IBM says it will offer "performance improvements in handling:

"-- 'page' data transfer in virtual storage computer systems
"-- partitioned data set directories
"-- job queues
"-- data management and access methods files
"-- application files, including indexes, tables and work areas"

Purchase price of $4,400 is exactly twice that of the higher capacity (69.8 megabyte) module that has only movable heads; ETP is $140 a month, with rent set at $165. To use the new 3348 Model 70F module, a two-drive 3340 must have a fixed head feature that goes for $40 a month ETP, $47 on rental. The equipment -- that "can help improve overall performance of virtual storage systems by reducing the time it takes a computer to access frequently used information" such as the index portion of an Indexed Sequential Access Methods (ISAM) file -- will be available for shipment or through field conversion the third quarter of this year.

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• UNIVAC HAS WON A MAJOR CONTRACT to install a new, nationwide teleprocessing network for McDonnell Douglas Automation, one of the largest computer services companies. The network -- estimated at an initial cost of about $18 million -- is designed to provide faster turnaround, fewer transmission errors and alternate routing for MCAUTOnet's users. Univac 3760 communications controllers located in cities serviced by the network will concentrate and distribute incoming data from dial-up lines to any of McDonnell Douglas Automation's six processing centers. The company currently operates 84 computers, valued at $145 million.

MCAUTOnet spokesmen said services on the network will be expanded continously through the next five years, according to current plans. Offerings include both remote batch and on-line processing and conversational timesharing. Teleprocessing via the 2,200 client terminals now on the network accounted for 70% of MCAUTOnet's commercial revenues last year, according to company sources.

• FOUR PROPRIETARY SOFTWARE PRODUCTS REACHED THE $10 million mark in sales during 1973, according to a compilation by International Computer Programs Inc. The four top packages were Autoflow II, by Applied Data Research; TOTAL, from Cincom Systems; SCERT, from Comress; and Mark IV, by Informatics. Three other products reached the $2 million mark: MSA Payroll/Personnel Software Accounting, from Management Science America; TALK, from Systems Architects, and LIFE/70 from TCC. Fifty-two other packages from 42 different manufacturers passed the $1 million level.

• MID-MONTH SAW A NUMBER OF MAINFRAMER EXECUTIVES out beating the drum for changes in attitudes toward the use of computers. William T. Bayer Jr., a planning executive for Honeywell, and William S. Anderson, president of NCR, struck at least one common note in their talks before two different groups -- Bayer pointed to a growing "shift in emphasis" from computer manufacturing to sales, service and software in the effort to "learn to use what we have," while Anderson, speaking to a group of systems managers, proclaimed the industry "has entered a period in which system development, rather than technical development, will comprise the leading edge of most information-processing advances."

But from that common point their perspectives seemed to diverge. Addressing fears that technology might adversely affect the human condition and that computers might rule the world, Bayer stressed "responsible actions" by the industry to dispel this "myth" and said that in the decades to come, innovators will have to question whether society wants or needs their new ideas. Anderson, by contrast, said that too many people still think of the computer as a cure-all and told the systems managers that their main challenge will be helping computers meet the high expectations of top managers and the public.

• INTERDATA, A RAPIDLY GROWING MINICOMPUTER manufacturer, has agreed in principle to merge with Perkin-Elmer Corp., a maker of scientific instrumentation equipment. Interdata earned $1.2 million last year on sales of $18.9 million; Perkin-Elmer earned $15.3 million on sales of $219.3 million.

• PERIPHERALS FOR MICROCOMPUTERS designed for software compatibility with the one-chip processors now in use will be the primary product of iCOM Inc., a new company formed recently by a former Xynetics executive. Its first product, a high-speed paper tape reader compatible with Intel's 4-bit and 8-bit microcomputer systems, will be available within a few weeks, a spokesman said.

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Review and Forecast

EDP industry report

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"THE GRAY SHEET" APRIL 19,1974 • VOL.9,NO.13 P.J.McGOVERN,PUBLISHER

Signs of synergism

INDUSTRY FUNDAMENTALS FINALLY LOOK GOOD AS COURTS CAST A CLOUD

For the first time in many a computeryear, major industry forces are not working at cross purposes. Indeed, for an industry shipping products at a $10-billion-a-year clip, the American-based computer business has a lot going:

- The teleprocessing growth phase entered last year continued strong throughout 1973 . . . undaunted by the Energy Crisis or talk of possible recession.

- Retirements as a percent of shipments dropped below the 50% level, and should stay in the 40%-to-50% range for the rest of this decade.

- As a result, U.S.-based mainframe manufacturers last year netted $4.7 billion on worldwide general-purpose shipments of $8.8 billion, bringing the installed base to $44.5 billion.

- The minicomputer market seems to be more insatiable each year; 1974 shipments of 50,000 units should be worth over $1 billion.

- Autotransaction hardware, or information appliances, accounted for $340 million in 1973; shipments are forecast to hit $1 billion by 1975, overtake the growing mini business a year or two later . . . while general-purpose shipments hover at the $9 billion level.

- Services of all types -- autotransaction and otherwise -- exceeded $2 billion in 1973 and should hit the $4 billion level in 1976.

Thus, the computer industry outlook is generally good . . . even great in sectors such as those singled out above. Yet a pall -- a transient lethargy at best -- pervades the industry's atmosphere. Some of it stems from Washington and Wall Street. A more serious portion, EDP/IR suspects, can be traced to various courts that hold IBM's -- and much of the computer industry's -- future in the balance.

Be that as it may, there are real signs that a new condition, synergism, is developing; independent activities in various portions of the computer industry are beginning to have more effect on the total industry than could be expected. The result is more pockets of safer business that is harder to measure.

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Looking back . . . and ahead

In preparing this Review and Forecast issue of EDP Industry Report, the editors have attempted to be particularly thoughtful. Ten years ago, the International Data Corporation published the first issue of this newsletter . . . a few weeks later, IBM announced System/360 and a distinct cycle of the computer industry began. Now, it seems to EDP/IR, the forces for another wave are building up within the still-young computer industry.

A rare glimpse into a major force center, IBM, was provided last year when many planning documents and reports of top-level management thinking were made public in the Telex/IBM trial. These 14,000 pages give only a partial picture of even IBM; but, when read in proper context they shed light on what happened and what might be expected. They also provide lots of data for examination.

Therefore, a fundamental part of IDC's computer industry snapshot this year involved the careful review -- and revision -- of EDP/IR's market data (pages 7 through 9) in light of the "Telex numbers" and other data. The historical portion of these basic figures will not casually be changed; IDC's projections, of course, will continue to be revised whenever there is better information.

Across the page, we've graphed the shipment, retirement, and "net add" numbers from page 7. They are worldwide, for U.S.-based manufacturers, and include both general-purpose (Group A) and dedicated application (Group B) computers (but not data entry equipment, nor the emerging field of information appliances -- see page 12). Basic assumptions are:

- Constant dollar base -- Because of technological innovation, inflation has never been a serious factor in measuring the computer industry. This may or may not continue, but all figures are in current dollars for the past, and in 1973/1974 dollars for forecasts.

- Technological innovation -- Three generations of electronic technology (discrete transistors, integrated circuits, and large scale integration) are represented in the installed base, with per-function costs continually declining. IDC believes this price elasticity will continue throughout the time period shown.

- Industry structure -- As mentioned earlier, a legal cloud -- and associated pleas for industry restructuring -- hangs ominously over the computer scene. But any change significant enough to alter macro-level forecasts cannot possibly be anticipated; thus, current industry structure (or a reasonable facsimile thereof) is assumed.

- Products -- Because of IBM's large share of market, shipment and retirement cycles are necessarily a function of IBM product introductions. These forecasts assume significant deliveries of FS (IBM's "future system," or successor to System/370) begin in 1977. Group A "Numbers" assume that computer systems will be counted more or less as they are today and that a sub-System/3 entry level system will be shipped in large numbers by 1976. Group B "Numbers" make no provision for specialized processors-on-a-chip that sell for a few hundred dollars or less. Even so, entries a few years out should be treated more like indications of a range. Also, many processors will be coupled, some in networks, in various degrees of "tightness."

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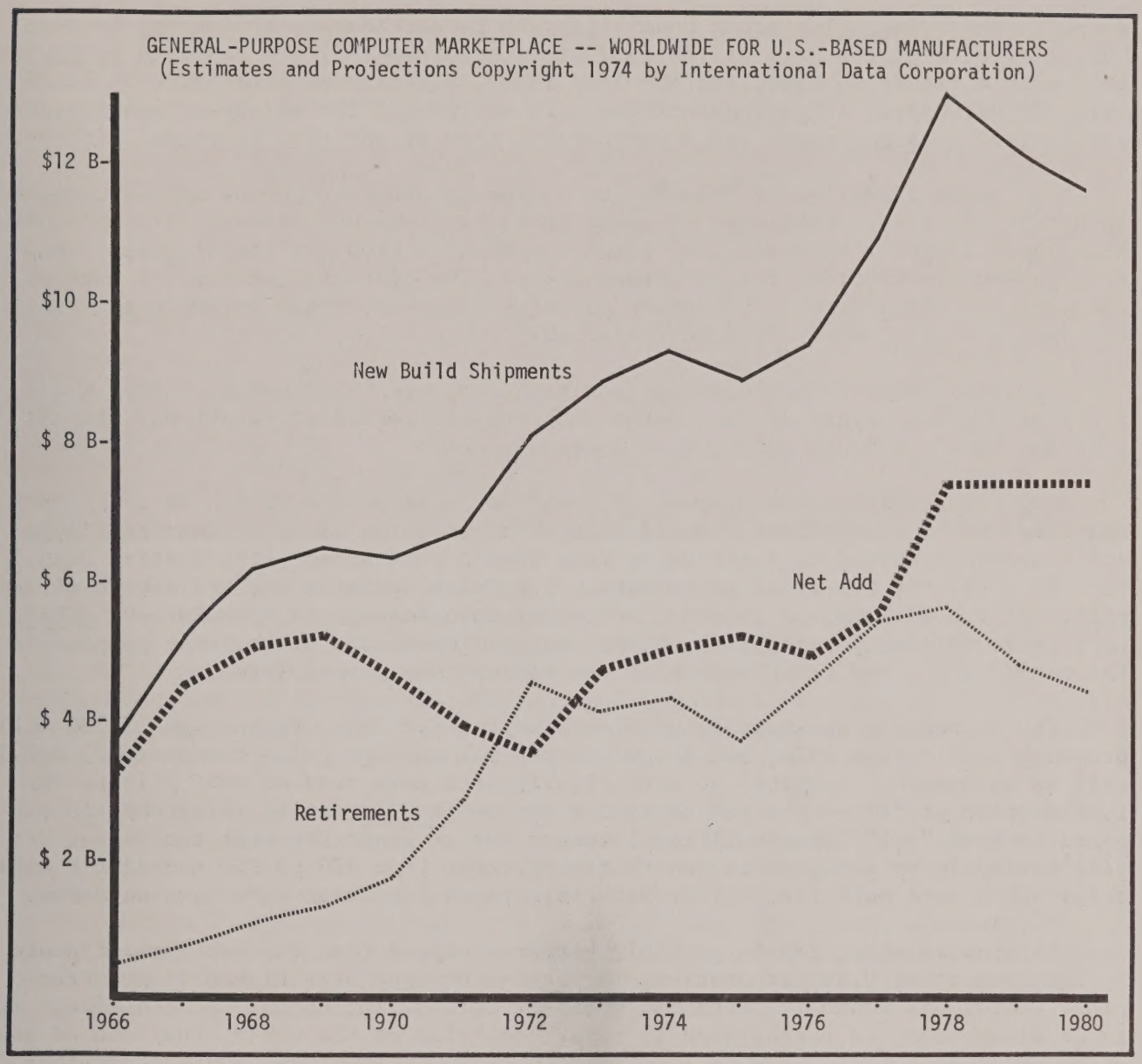

SYSTEMS, SOFTWARE, AND TELEPROCESSING KEY TO SUCCESS
AS GENERAL-PURPOSE SEGMENT ENTERS PERIOD OF STABILITY

The chart above indicates user demand as interpreted by IDC from several extensive surveys during the past two years. Incorporated into the numbers (page 8), as well, are IBM's internal assessments prepared about the time System/370 models were first being delivered. Shipments should increase 6% to the $9 billion level this year, then remain fairly flat until deliveries of IBM's FS begin. As retirements hold level or decline during the next couple of years, about $5 billion of each year's shipments should be added to the installed base.

In the U.S., only 43% of the computers (by value) are currently on rent (see page 6), down from 50% last year and 55% the year before. IDC surveys indicate that more and more users plan to purchase (or would like to arrange a third-party lease) and the extent to which this trend continues will determine the structure of the computer industry. One argument is this merely reflects better management and commitment to long-range plans on the part of users; IDC's extensive research

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supports this view. The other possibility to be considered, of course, is that subtle efforts on the part of IBM (and other mainframers?) are designed to foster this user attitude so that, for the late 1970s, a truly new generation of hardware can be shipped in vast quantities. In any event, the mainframe manufacturers control less equipment (as a percentage) than at any time in recent history.

The above situation -- in addition to the growing sophistication of computer networks and the commitment of users to incorporate key aspects of their business under computer management -- points to what is probably the strongest trend in computer acquisition considerations today. The operating system, or control software, is becoming more important to users than the actual hardware selected for use in a particular sized installation.

With the above points serving as a backdrop, here's a rundown on where the major mainframers stand as they enter a three-year period of relatively stable shipment levels and net addition to installed base:

IBM -- The big question about IBM, and for that matter about the entire EDP industry, is in the courts. The Telex verdict is being appealed (see page 16), and a decision should be forthcoming from Denver this summer; the Justice Dept. case is still set for trial in October. The Telex decision has had little if any effect in the marketplace to date, so rather than indulge in speculation, EDP/IR in this issue simply recognizes the monumental importance of whatever happens in the courts . . . and takes a look at the medium-term marketplace.

The forseeable business future looks bright for IBM. Production of 370 will probably peak during 1974, and a new entry-level machine below the System/3 likely will be announced. Probably of more significance this year or next will be the introduction of "Q" -- the new operating system (EDP/IR Jan.16,1974) that is supposed to meet "all" functional requirements for at least the next ten years. It will obviously be designed to smooth the movement from 370 to FS, and likely will offer users much more flexibility with teleprocessing/large data base networks.

Internationally, IBM is probably better equipped than the other mainframers -- than any other U.S. corporation, in fact -- to cope with fluctuating currencies, individual economic problems, the fuel crisis, inflation, and the like. It is so widespread, so established in major countries of the world, that one of the major challenges facing IBM is convincing nationalistic-minded governments that what's good for IBM is good for the individual country. There is growing pressure for at least the major World Trade companies to offer some local ownership.

HIS -- Honeywell has done an effective job in managing the merger of GE's computer interests in 1970. The 6000 series, for example, has proved to be more attractive to customers than even HIS management could have expected, and has accounted for considerable new business. But the rest of HIS's product line is old -- even the 2000 which is a price/improved version of the 200 series first introduced in 1963 -- and the company's prospects hinge on the new product line that was scheduled for introduction shortly after this issue went to press. A full report will be presented in the next issue, but early indications were that the new series would tie together many of the loose ends and clarify upgrade paths.

Univac -- In retrospect, Univac's 1972 acquisition of RCA's computer base has been much more successful than was expected. Loyalty from these users is measured by IDC as continuing at the 70%-to-80% level. And at the upper end of its product line, Univac's 1100 series -- especially the low-end 1106 -- if quite

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STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS

	1973 Shipments:		In Use Yearend 1973:		
	$M	% Total	$M	% Total	1972-73 Change
IBM	5,974	62.4	29,017	60.5	+ 11.4%
Plug-Compat.	574	6.0	1,620	3.4	+ 31.4%
HIS	831	8.7	5,010	10.5	+ 11.5%
Univac/RCA	554	5.8	3,618	7.5	+ 6.9%
Burroughs	456	4.8	2,244	4.7	+ 15.6%
DEC	272	2.8	964	2.0	+ 40.1%
NCR	270	2.8	1,205	2.5	+ 11.4%
CDC	243	2.5	1,996	4.2	+ 7.4%
Others (including minis)	401	4.2	2,254	4.7	+ 26.7%
TOTALS	9,575	100.0	47,928	100.0	+ 12.8%

successful in teleprocessing and data base operations. The small end of the 9000 series is entering obsolescense, and before this begins to hurt business, EDP/IR expects to see Univac introduce an entry level series to compete with System/3 as well as offer growth potential for 9200 and 9300 users. It might well be upward compatible with the successful 1100 series. Generally, Univac has broadened its industry stance via acquisition -- with Group B computers from EMR, disk file business from Data Products, peripherals from ISS, shared processors from Pertec.

Burroughs -- With perhaps the most complete full-line offering outside IBM, Burroughs has taken advantage of its established MCP operating system and continues to meet user needs for teleprocessing and data base operations. The 1700 is about the only computer making any inroads on the IBM installed base. Shipments of the 700 series are estimated to be about the midpoint of the generation cycle, so Burroughs seems to be in excellent position for the next year or two, at least. Its customers remain loyal, putting up with occasional startup problems because they like the results they eventually get from Burroughs offerings.

NCR -- Under new management and finally showing a profit in its computer operations, NCR is succeeding under a strategy that it used defensively: NCR needs computers . . . to support the business activity it excells at. It's new 299 electronic bookkeeping machine -- and the 399 -- should appeal widely for sub-entry-level computer and terminal business. NCR is also moving strongly in the autotransaction marketplace (page 12). On the computer front, the price/performance improved Century 101 and 251 -- plus the 300 -- seem to offer customers adequate upgrade paths until the joint CPU development program with CDC is announced.

CDC -- Recently (page 16), the "maker of the world's most powerful computers" transformed established product designs into integrated circuits and called it Cyber 170, introduced a Network Operating System, and completely unbundled software. This should probably more than supply customer needs until the series being developed with NCR is ready. For all its clout with big number crunchers, however, CDC is one of the most diversified suppliers in the information processing industry. Following last year's acquisition of Service Bureau Corp., services now account for about one fourth of CDC's computer-related revenues; also, it is the largest supplier of IBM plug-compatible peripherals.

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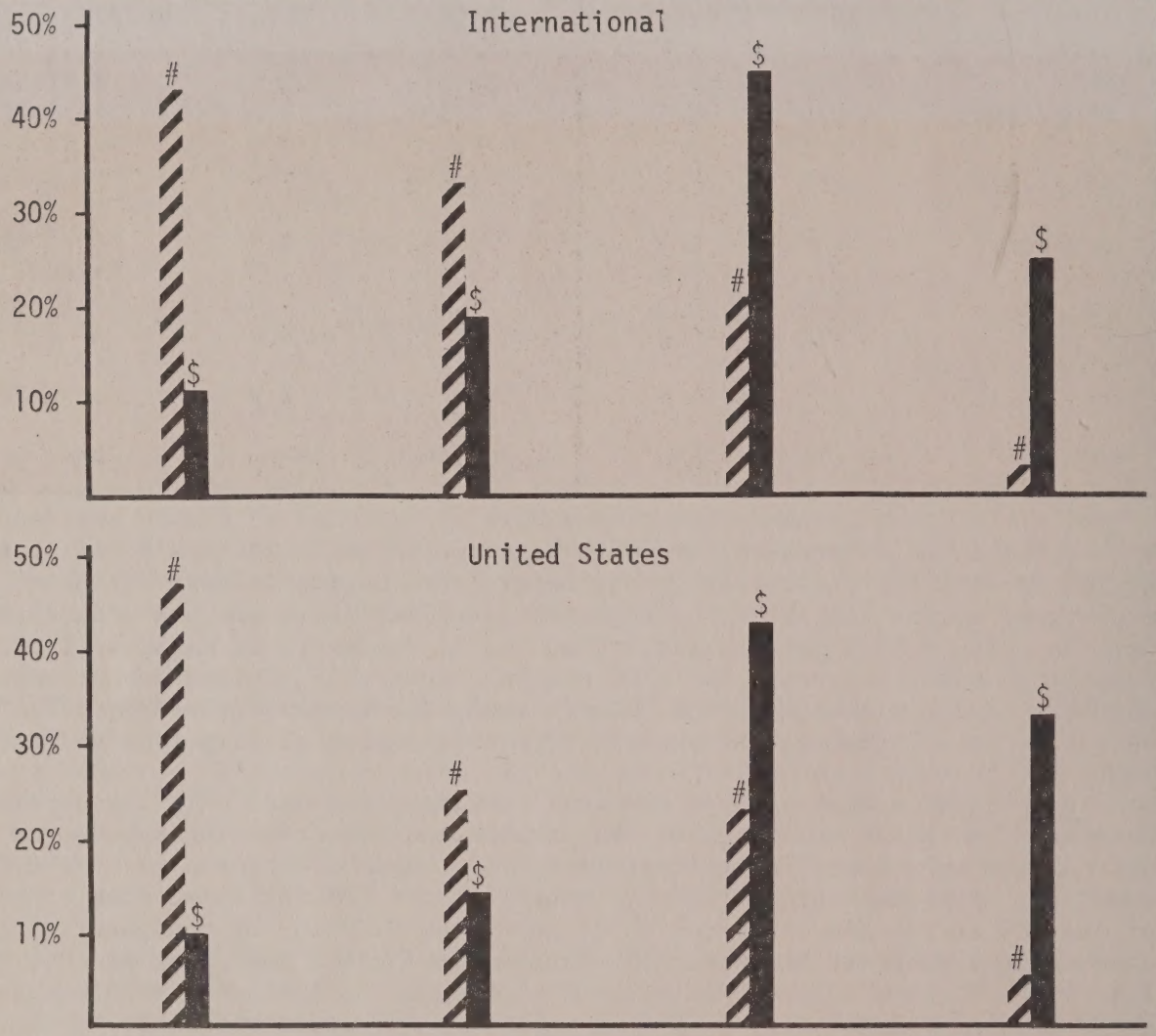
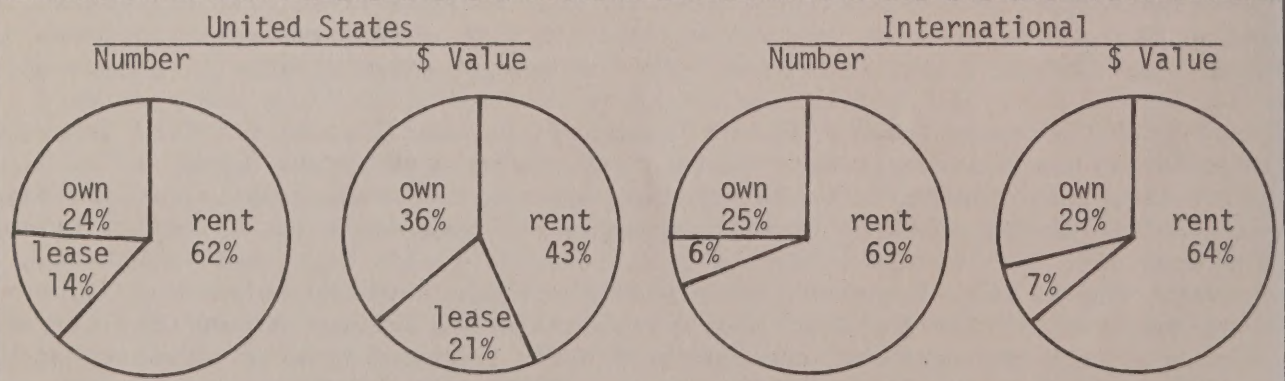
PRICE CLASS DISTRIBUTION OF GENERAL-PURPOSE COMPUTERS INSTALLED, YEAREND 1973
(U.S.-Based Manufacturers; Copyright 1974 by International Data Corporation)



Rental:	Below $2,500	$2,500-10,000	$10,000-40,000	Above $40,000
Purchase:	Below $115K	$115K-$450K	$450K-$1.8M	Above $1.8M

DISTRIBUTION OF GENERAL-PURPOSE COMPUTERS BY ACQUISITION METHOD
(Installed, Yearend 1973; Copyright 1974 by International Data Corporation)



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WORLDWIDE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1966	10,500	44,300	$ 3,825	$ 13.7
1967	18,450	55,900	5,420	18.4
1968	17,600	71,400	6,422	23.7
1969	19,100	87,000	6,805	29.3
1970	23,100	105,800	6,715	34.2
1971	27,800	129,200	7,077	38.5
1972	40,900	160,300	8,535	42.5
1973	55,350	204,800	$ 9,575	$ 47.9
1974	69,500	266,000	10,385	54.0
1975	89,500	348,500	10,330	60.6
1976	117,000	457,500	11,220	67.3
1977	147,000	595,000	13,130	74.8
1978	170,000	753,000	15,670	84.7
		UNITED STATES		
1966	7,000	31,100	$ 2,690	$ 9.9
1967	12,000	37,000	3,775	13.1
1968	11,000	46,500	4,367	16.6
1969	12,700	56,800	4,430	20.3
1970	14,600	68,300	3,920	23.0
1971	17,600	83,200	4,177	25.1
1972	27,400	104,000	5,395	26.8
1973	38,700	133,250	$ 5,945	$ 29.9
1974	47,300	171,500	6,350	33.5
1975	59,500	222,500	5,775	37.2
1976	78,000	290,500	6,120	40.9
1977	100,000	376,000	7,375	45.0
1978	112,000	481,000	8,720	50.4
		INTERNATIONAL		
1966	3,500	13,200	$ 1,135	$ 3.8
1967	6,450	18,900	1,645	5.3
1968	6,600	24,900	2,055	7.1
1969	6,400	30,200	2,375	9.0
1970	8,500	37,500	2,795	11.2
1971	10,200	46,000	2,900	13.4
1972	13,500	56,300	3,140	15.7
1973	16,650	71,550	$ 3,630	$ 18.0
1974	22,200	94,500	4,035	20.5
1975	30,000	126,000	4,555	23.4
1976	39,000	167,000	5,100	26.4
1977	47,000	219,000	5,755	29.8
1978	58,000	272,000	6,950	34.3

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GENERAL PURPOSE COMPUTER MARKET (GROUP A)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1966	9,000	39,100	$ 3,700	$ 13.1
1967	15,700	48,000	5,200	17.6
1968	13,000	59,000	6,150	22.6
1969	11,000	66,700	6,450	27.8
1970	12,000	74,800	6,300	32.4
1971	14,300	85,200	6,700	36.3
1972	18,300	94,800	8,035	39.8
1973	21,450	106,800	$ 8,805	$ 44.5
1974	19,500	120,000	9,300	49.5
1975	18,500	133,500	8,900	54.7
1976	21,000	148,500	9,400	59.6
1977	26,000	167,000	10,900	65.1
1978	26,000	183,000	13,000	72.5
		UNITED STATES		
1966	6,000	27,100	$ 2,600	$ 9.4
1967	10,000	31,000	3,600	12.4
1968	7,400	37,000	4,150	15.7
1969	6,000	40,700	4,150	19.1
1970	5,700	43,800	3,600	21.5
1971	7,600	49,200	3,900	23.3
1972	10,700	54,000	5,035	24.7
1973	14,000	62,250	$ 5,405	$ 27.3
1974	11,300	70,000	5,600	30.1
1975	9,500	77,000	4,800	32.9
1976	11,000	85,000	4,900	35.4
1977	16,000	97,000	5,900	38.2
1978	14,000	106,000	7,000	42.0
		INTERNATIONAL		
1966	3,000	12,000	$ 1,100	$ 3.7
1967	5,700	17,000	1,600	5.2
1968	5,600	22,000	2,000	6.9
1969	5,000	26,000	2,300	8.7
1970	6,300	31,000	2,700	10.9
1971	6,700	36,000	2,800	13.0
1972	7,600	40,800	3,000	15.1
1973	7,450	44,550	$ 3,400	$ 17.2
1974	8,200	50,000	3,700	19.4
1975	9,000	56,500	4,100	21.8
1976	10,000	63,500	4,500	24.2
1977	10,000	70,000	5,000	26.9
1978	12,000	77,000	6,000	30.5

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DEDICATED APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Million Value In Use
		WORLDWIDE		
1966	1,500	5,200	$ 125	$ 587
1967	2,750	7,900	220	807
1968	4,600	12,400	272	1,079
1969	8,100	20,300	355	1,433
1970	11,100	31,000	415	1,845
1971	13,500	44,000	377	2,216
1972	22,600	65,500	500	2,703
1973	33,900	98,000	$ 770	$ 3,453
1974	50,000	146,000	1,085	4,503
1975	71,000	215,000	1,430	5,878
1976	96,000	309,000	1,820	7,608
1977	121,000	428,000	2,230	9,703
1978	144,000	570,000	2,670	12,173
		UNITED STATES		
1966	1,000	4,000	$ 90	$ 506
1967	2,000	6,000	175	681
1968	3,600	9,500	217	898
1969	6,700	16,100	280	1,177
1970	8,900	24,500	320	1,494
1971	10,000	34,000	277	1,766
1972	16,700	50,000	360	2,116
1973	24,700	71,000	$ 540	$ 2,641
1974	36,000	101,500	750	3,366
1975	50,000	145,500	975	4,301
1976	67,000	205,500	1,220	5,456
1977	84,000	279,000	1,475	6,836
1978	98,000	375,000	1,720	8,421
		INTERNATIONAL		
1966	500	1,200	$ 35	$ 81
1967	750	1,900	45	126
1968	1,000	2,900	55	181
1969	1,400	4,200	75	256
1970	2,200	6,500	95	351
1971	3,500	10,000	100	450
1972	5,900	15,500	140	587
1973	9,200	27,000	$ 230	$ 812
1974	14,000	44,500	335	1,137
1975	21,000	69,500	455	1,577
1976	29,000	103,500	600	2,152
1977	37,000	149,000	755	2,867
1978	46,000	195,000	950	3,752

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DEDICATED APPLICATION COMPUTER DEMAND SEEMS INSATIABLE; 1974 SHIPMENTS TO HIT 50,000 LEVEL WORTH OVER $1 BILLION

The marketplace boom for dedicated application computers -- mostly minis -- that began last year accelerated during 1973 and it looks as if the end is nowhere in sight (page 9). Shipments were up 54% to the $770 million level worldwide for U.S.-based manufacturers . . . and all indications are for another 40% increase this year to just over $1 billion. And with the average system shipped holding at the $22,000 level, this means shipments of 50,000 Group B computers, of which some 70% will be in the United States.

Who needs all this processing capacity? The list of applications continues to grow. About 60% of the minicomputers shipped in the U.S. (worth almost half the total value) go first to an OEM manufacturer for inclusion in shared processor (data entry) systems, intelligent terminals, turnkey systems for small business, and a growing number of consumer-oriented (autotransaction) products such as point-of-sale systems, automated bank tellers, credit authorization systems, and even automated gas stations.

Minis are used in industrial automation across the board, as concentrators in teleprocessing networks, for plant security, and in special applications such as traffic light control. Furthermore, IBM's entry -- the sensor-based System/7 -- is broadening the market rather than increasing competition as it connects more and more "live" applications to centralized System/370s.

Some dedicated application computers, such as IBM's System/7, can be relatively expensive; others, like those from Microdata, very inexpensive. Across-the-board suppliers such as Digital Equipment have a wide mix, so market share tends to be the same by number or dollar. The primary reason average system cost continues to remain upwards of $20,000 is because of peripherals, even though a number of suppliers -- Caelus, Centronics, Data Products, Diablo, Iomec, Pertec -- are specializing in mini-peripherals. Here's a breakdown of system shipments for the major suppliers of dedicated application computers in 1973:

Company	# Units	% Total	$M Value	% Total
Digital Equipment	10,800	31.9	$ 242	31.4
IBM	1,500	4.4	90	11.7
Hewlett Packard	2,450	7.2	83	10.8
Honeywell	1,060	3.1	69	9.0
Data General	4,400	13.0	58	7.5
General Automation	2,550	7.5	$ 44	5.7
Varian	1,280	3.8	32	4.2
Interdata	780	2.3	19	2.5
Computer Automation	2,730	8.1	15	1.9
Xerox	140	0.4	14	1.8
Systems Eng. Labs	85	0.3	$ 13	1.7
Modular Computer	485	1.4	12	1.6
Microdata	1,550	4.6	9	1.2
Digital Computer Cont.	900	2.7	5	0.6
All Other	3,190	9.3	65	8.4
TOTALS	33,900	100.0	$ 770	100.0

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PLUG-COMPATIBLE MEMORY EQUIPMENT INSTALLED IN UNITED STATES
(International Data Corporation Estimates at IBM Purchase Price, Copyright 1974)
($ Million In Use at Yearend)

	1970	1971	1972	1973	1974
Tape Drives	$ 185	$ 210	$ 276	$ 342	$ 407
Disk Drives	370	480	522	640	772
360 Memory	8	79	212	308	350
370 Memory			5	35	125
TOTAL	$ 563	$ 769	$1,015	$1,325	$1,654

PLUG-COMPATIBLE MANUFACTURERS FACE CHALLENGES DESPITE POST-TELEX GROUNDRULES

When Judge Christensen found in his Telex/IBM decision that the business of supplying peripherals for IBM computers was indeed a market, he essentially legitimatized the child . . . but he didn't tell the competitors how to grow up. Several major PCMers are suing in the wake of Telex, and confirmation of Christensen's decision by the Denver appeals court (see page 16) could well lead to eventual damage awards or monetary settlements from IBM. But a one-shot infusion of cash is not the answer to the business challenges that will determine long-term profitability for PCM suppliers. Some of the basic questions:

- What is the proper mix of sales to OEM accounts and leasing companies versus rentals to end users? Calcomp has found that an even distribution seems to work. How do PCMs attain this mix?

- What about obsolescense? A shorter market life is inherent for a product that must be virtually a copy of IBM's offering. Will the relief provided by the court go far enough toward solving this problem?

- What about leasing company competition? When a new product is first announced, third-party leasing companies usually acquire peripherals from IBM until PCM offerings are ready. These provide competition when there is a scramble for remarketability of older peripherals.

- And what about the memory business? The big potential this year is in 370 (semiconductor) memory. Long-term, however, the semiconductor manufacturers loom as potential competition . . . and solid-state is obviously the direction of the entire peripheral business.

- Also, of most long-term significance, what about changing system design trends? As electronics components become physically smaller, and computer systems get more complex, there is true design advantage to including peripheral controls within the central computer itself. This leaves less and less profitable business for PCMers.

Questions such as these -- plus the plain difficulty of keeping up with IBM technological developments such as the 3340 drive which now is a combination drum and disk -- set the long-term stage for viability in the plug-compatible marketplace. Not all the PCM suppliers' problems are going to be solved in the courtroom. On the other hand, the IBM customer base is essentially a world unto itself -- other mainframers often have a better chance competing with one another than with IBM -- so the questions are worth solving. The rewards are great.

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WIDE-OPEN SERVICES AND AUTOTRANSACTION MARKETS HOLD BIG GROWTH POTENTIAL

As the tables and charts on these two pages indicate, there is plenty of growth potential in at least two overlapping sectors . . . and room for new participants: The top ten suppliers of computer services account for only 30% of the $2.2 billion business; in autotransaction, nine major suppliers account for only 36% of what's already a billion-plus dollar business growing more than 40% a year. Both sectors are fragmented, and likely to remain so. They are composed of scores of business segments, each requiring considerable industry/applications knowhow.

Services, as IDC has defined it for some time (EDP/IR Sept.15,1972) is best examined as a matrix (page 13) of access methods and types of use. Batch modes of operation are quickly giving way to remote batch or Rair (remote access/immediate response) as teleprocessing and networking concepts take hold. Traditional batch operations -- supplying backup or alternate sources of computer power, as it were -- will lose relative share to communications-oriented services, more and more of which cater to the specific needs of a particular type of customer.

At present, the four leading companies in the computer services market are Control Data, currently operating at the $150 million level after its acquisition of Service Bureau Corp.; Electronic Data Systems, at the $100 million level; GE and Automatic Data Processing, each of which had revenues of about $85 million in 1973. The variety of services offered by these participants illustrates the scope of computer services. Several large companies -- with virtually no computer service revenue at present -- have stated business objectives of becoming industry leaders by 1980; thus, a certain amount of consolidation in services is expected.

Autotransaction is the concept IDC developed during 1973 to describe computer-related products and services that are designed with a particular business sector and/or specific application in mind, that involve transactions to and from a data base, and that are for sale. In addition to that portion of the services industry falling into this category, autotransaction includes the booming field of information appliances such as point-of-sale and special banking terminals.

Leaders in autotransaction, during 1973, were Bunker Ramo, EDS, NCR, and Singer, which combined had revenues of about $300 million. IBM announced products for banking and retailing last year, so must be contended with as an entrant; however, its domination is by no means a foregone conclusion. Singer is the leader in retail POS; NCR is coming on strong there, and about to announce a family of terminals for banking; Univac as well as the established POS companies is aiming at the supermarket area, where Bunker Ramo has about half the business and MSI Data has great potential to build on its customer base for cassette/recorders.

AUTOTRANSACTION INDUSTRY -- WORLDWIDE REVENUES OF U.S. SUPPLIERS
(Estimates in $ Millions; Copyright 1974 by International Data Corporation)

	1972	1973	1974	1975	1976	1977	1978
Batch Transaction	$ 285	$ 360	$ 440	$ 515	$ 595	$ 685	$ 790
Other Computer Services	270	410	605	860	1185	1580	2065
Information Appliances	150	340	640	1090	1740	2700	4050
Turnkey Systems	40	80	150	265	450	725	1085
Miscellaneous Products	105	145	205	285	390	515	660
TOTAL	$ 850	$1335	$2040	$3015	$4360	$6205	$8650

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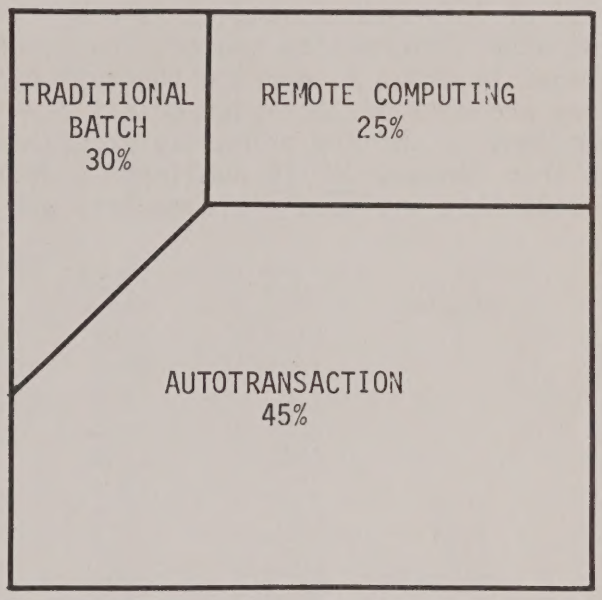
CHANGING STRUCTURE OF COMPUTER SERVICES INDUSTRY
(Worldwide Revenues of U.S.-Based Companies; IDC Estimates Copyright 1974)

1973: $2.2 Billion

Batch Raw Power 4%	Remote Batch Raw Power 8%	RAIR Raw Power 14%
Batch Transaction 59%	Remote Batch Transaction 1%	RAIR Transaction 5%
Batch DB Inquiry 1%	Remote Batch DB Inquiry 1%	RAIR DB Inquiry 7%

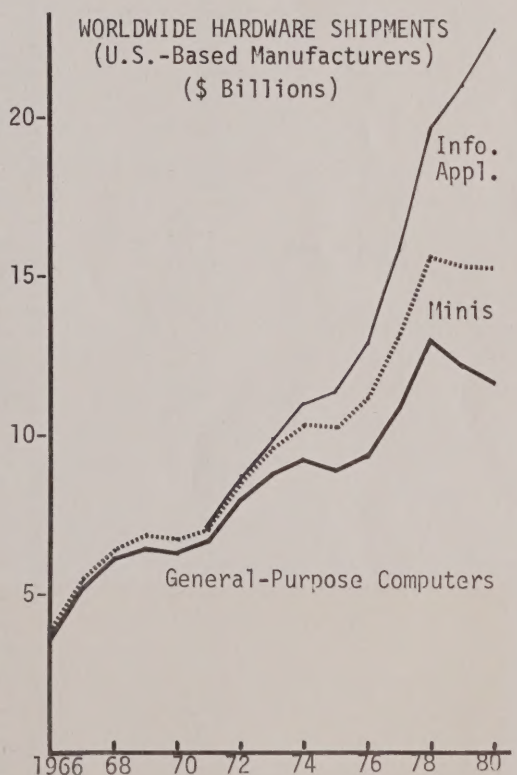
1976: $4 Billion



The new (synergistic) computer industry

Just as autotransaction represents the exciting portion of the services industry, information appliances and associated systems will be important to hardware growth. The lowest line at right -- Group A shipments -- provides a reference for examining total hardware shipments. To it is added Group B shipment figures and the preliminary autotransaction figures from across the page. Thus, despite the maturing, cyclical posture the general-purpose segment is developing, the total shipment curve retains the shape most people were drawing a few years ago.

And the components hint at coming synergistic effects: Special terminals will need more general-purpose backup for data bases; systems will include minis for communications, control, and local processing. The growth of services (above) will foster user purchase of more special terminals. Likewise, new types of information appliances will lead to cost savings, better ways of doing business, and more sales of terminals. It's a succession of supportive cycles that require each other -- it's synergistic.



During the coming year, International Data Corporation plans increased research efforts in these growing areas; the total growth of the information appliance curve, for example, is really the sum of many startup situations. Results will be reported on a regular basis in AUTOTRANSACTION Industry Report.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF JANUARY 1, 1974

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	B-200 Series	$ 5,600	11/61	105	75	180	X
	B-300 Series	$ 5,200	7/65	375	70	445	X
	B-500	$ 6,000	11/68	455	450	905	X
	B-705/711	$ 1,300	3/73	100	60	160	215
	B-1712	$ 1,950	8/72	130	46	176	150
	B-1714	$ 2,200	8/72	205	110	315	180
	B-1726	$ 5,300	2/73	115	18	133	140
	B-1728	$ 7,700	8/73	20	9	29	90
	B-2500	$ 8,200	2/67	260	140	400	X
	B-2700	$ 8,700	8/72	90	70	160	90
	B-3500	$ 14,700	5/67	635	355	990	X
	B-3700	$ 20,000	11/72	38	7	45	45
	B-45/4700	$ 27,000	10/71	110	80	190	65
	B-5500	$ 35,000	3/63	82	30	112	X
	B-5700	$ 29,500	12/70	18	5	23	8
	B-65/6700	$ 50,000	11/69	60	50	110	15
	B-7700	$120,000	8/73	3	1	4	15
	Subtotal			2,801	1,576	4,377	1,013
Control Data Corp.	G-20	$ 19,600	4/61	3	5	8	X
	1604/A/B	$ 42,000	1/60	17	4	21	X
	31/3150	$ 9,000	12/64	86	48	134	X
	3170	$ 17,500	12/70	14	14	28	X
	3200	$ 14,700	5/64	49	44	93	X
	3300	$ 28,800	9/65	117	90	207	X
	3400	$ 23,700	11/64	4	8	12	X
	3500	$ 26,000	1/64	10	17	27	X
	3600	$ 48,000	6/63	18	15	33	X
	3800	$ 53,000	12/65	19	3	22	X
	6200	$ 39,000	11/70	2	6	8	X
	Cyber-72	$ 33,000	10/71	17	31	48	11
	6400	$ 54,000	5/66	57	49	106	X
	Cyber-73	$ 47,000	3/72	8	24	32	9
	6500	$ 68,000	12/67	20	12	32	X
	6600	$115,000	8/64	58	31	89	X
	Cyber-74	$105,000	3/72	2	6	8	4
	6700	$125,000	7/70	3	0	3	X
	7600	$165,000	1/69	9	6	15	X
	Cyber-76	$165,000	3/72	1	3	4	2
	Star-100	$250,000	8/73	1	0	1	2
	Subtotal			515	416	931	28
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	16	8	24	X
	1040/1050	$ 13,300	10/67	173	69	242	19
	1055	$ 22,000	12/71	24	8	32	12
	1070/1077	$ 30,000	6/72	12	1	13	6
	Subtotal			225	86	311	37
Honeywell	Gamma 10	$ 2,500	7/64	0	1,000	1,000	X
	Gamma 30	$ 9,900	2/62	0	150	150	X
	G-5X Series	$ 1,550	1/66	620	2,900	3,520	200
	G-100 Series	$ 4,000	4/66	285	1,550	1,835	X
	G-200 Series	$ 13,700	4/61	195	53	248	X
	G-405/410	$ 9,000	2/68	18	8	26	X
	G-415/420	$ 14,000	5/64	135	190	325	X
	G-425/430	$ 17,000	6/64	43	102	145	X
	G-435/440	$ 22,000	9/65	95	48	143	X
	G-615	$ 55,000	6/69	4	22	26	X
	G-625	$ 65,000	4/65	2	3	5	X
	G-635	$ 80,000	5/65	47	18	65	X
	G-645	$120,000	7/66	2	1	3	X
	G-6025	$ 21,800	11/73	10	2	12	63
	G-6030/40	$ 33,000	6/71	83	95	178	55
	G-6050/60	$ 46,500	7/71	74	26	100	37
	G-6070/80	$ 61,500	7/71	40	13	53	19
	G-6180	$100,000	2/74	-	-	-	4
	G-Subtotal			1,653	6,181	7,834	378
	H-105	$ 2,500	11/71	470	105	575	135
	H-110	$ 2,600	9/68	155	170	325	X
	H-115	$ 5,300	3/70	1,100	340	1,440	190
	H-120	$ 4,600	1/66	420	175	595	X
	H-125	$ 7,900	12/67	85	325	410	X
	H-200	$ 6,400	3/64	480	250	730	X
	H-2020	$ 2,350	2/73	215	20	235	140
	H-2030	$ 5,050	1/73	38	5	43	35
	H-2040	$ 9,000	4/72	230	73	303	90
	H-1015	$ 12,500	4/71	95	53	148	25
	H-2050	$ 14,100	4/72	135	35	170	50
	H-12/1250	$ 12,000	2/66	315	160	475	X
	H-2015	$ 17,800	2/71	100	44	144	25
	H-2060	$ 18,500	4/72	60	8	68	20
	H-2200	$ 19,600	1/66	120	48	168	X
	H-2070	$ 23,000	5/72	39	4	43	13
	H-3200	$ 26,900	2/70	64	29	93	X
	H-4200	$ 31,000	9/68	29	5	34	X
	H-2088	$ 44,000	4/72	4	1	5	2
	H-8200	$ 73,000	2/69	22	4	26	X
	H-4/1400	$ 13,200	12/61	28	25	53	X
	H-800	$ 28,500	12/60	35	11	46	X
	H-1800	$ 46,000	7/64	7	4	11	X
	H-Subtotal			4,246	1,894	6,140	725
	HIS Totals			5,899	8,075	13,974	1,103

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AS OF JANUARY 1, 1974

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System 3/6	$ 1,700	12/70	3,015	1,710	4,725	785
	System 3/10	$ 2,420	1/70	15,500	6,930	22,430	2,800
	System 3/15	$ 4,550	3/74	-	-	-	1,400
	360/20	$ 3,600	12/65	3,402	4,845	8,247	X
	360/22	$ 5,800	7/71	1,105	300	1,405	X
	370/115	$ 6,650	4/74	-	-	-	1,700
	360/25	$ 7,500	10/68	764	1,115	1,879	X
	370/125	$ 9,800	6/73	770	415	1,185	1,200
	360/30	$ 11,000	6/65	3,104	2,475	5,579	X
	370/135	$ 16,225	5/72	2,200	1,010	3,210	1,000
	360/44	$ 14,200	7/66	68	82	150	X
	360/40	$ 19,400	6/65	1,510	1,775	3,285	X
	370/145	$ 27,800	7/71	1,700	790	2,490	515
	360/50	$ 32,100	8/65	662	560	1,222	X
	370/155	$ 53,350	2/71	1,190	510	1,700	X
	370/158	$ 59,200	5/73	147	100	247	425
	360/65	$ 68,000	11/65	482	225	707	X
	370/165	$ 95,000	6/71	210	63	273	X
	370/168	$110,200	7/73	50	12	62	150
	360/67	$112,000	6/66	39	14	53	X
	360/75	$ 94,000	1/66	33	16	49	X
	360/85	$141,000	10/69	4	4	8	X
	360/9X	$150,000	11/67	14	2	16	X
	370/195	$194,600	3/71	19	4	23	8
	1130	$ 2,300	2/66	2,720	1,900	4,620	X
	1401	$ 3,700	9/60	1,100	840	1,940	X
	1401-G	$ 2,300	5/64	90	40	130	X
	1401-H	$ 1,300	6/67	53	44	97	X
	1410	$ 17,000	11/61	97	54	151	X
	1440	$ 4,700	4/63	245	250	495	X
	1460	$ 9,800	10/63	55	40	95	X
	1620	$ 2,700	9/60	325	230	555	X
	7010	$ 26,000	10/63	13	7	20	X
	7030	$160,000	5/61	3	1	4	X
	704	$ 32,000	12/55	1	1	2	X
	7040	$ 25,000	6/63	9	16	25	X
	7044	$ 36,500	6/63	8	10	18	X
	705	$ 38,000	1/56	3	3	6	X
	7070-74	$ 27,000	3/60	101	36	137	X
	7080	$ 60,000	8/61	48	1	49	X
	7090/94	$ 70,500	8/60	72	11	83	X
	Subtotal			40,931	26,441	67,372	9,983
NCR	Century-50	$ 1,950	2/71	895	45	940	160
	Century-100	$ 2,980	9/68	1,150	800	1,950	X
	Century-101	$ 2,750	10/72	300	25	325	140
	Century-200	$ 7,900	9/69	640	360	1,000	60
	Century-251	$ 10,000	11/73	15	10	25	75
	Century-300	$ 20,000	2/72	25	17	42	17
	304	$ 10,000	1/60	6	0	6	X
	310	$ 1,000	5/61	15	10	25	X
	315	$ 5,000	5/62	325	270	595	X
	315-RMC	$ 11,800	9/65	55	45	100	X
	390	$ 800	5/61	250	160	410	X
	500	$ 1,100	10/65	765	1,550	2,315	X
	Subtotal			4,441	3,292	7,733	452
Philco	1000	$ 7,000	6/63	15	1	16	X
	210/211	$ 40,000	10/58	10	1	11	X
	212	$ 52,000	1/63	8	1	9	X
Singer	System 10	$ 2,500	10/70	870	640	1,510	475
Standard Computer	IC-4000	$ 9,000	9/68	4	0	4	X
	IC-6000	$ 16,000	5/67	3	0	3	X
	IC-7000	$ 17,000	6/69	7	0	7	X
Univac	I/II	$ 25,000	3/51	3	2	5	X
	III	$ 25,400	8/62	35	37	72	X
	SS-80/90	$ 8,000	8/58	21	23	44	X
	418-I/II	$ 13,700	6/63	74	78	152	X
	418-III	$ 19,600	7/69	42	52	94	10
	491/492	$ 27,000	12/61	17	12	29	X
	494	$ 41,400	2/66	52	41	93	X
	1004	$ 1,000	2/63	900	940	1,840	X
	1005	$ 1,630	4/66	705	200	905	X
	1050	$ 8,800	9/63	182	140	322	X
	1103/5	$ 35,000	12/50	0	3	3	X
	1106	$ 40,000	12/69	67	93	160	30
	1107	$ 57,000	10/62	7	13	20	X
	1108	$ 68,000	9/65	135	97	232	X
	1110	$ 79,000	6/72	11	22	33	22
	9200	$ 2,300	6/67	1,550	935	2,485	X
	9300	$ 4,050	9/67	895	880	1,775	X
	9400	$ 11,600	5/69	250	270	520	55
	9700	$ 21,600	8/72	11	17	28	X
	90/60	$ 16,200	1/74	-	-	-	NA
	90/70	$ 22,000	11/73	3	0	3	NA
	Subtotal			4,960	3,855	8,815	117
	301	$ 6,600	10/60	166	8	174	X
	501	$ 16,100	6/59	15	0	15	X
	3301	$ 22,700	7/64	65	0	65	X
	Spectra 70/15	$ 4,000	9/65	13	0	13	X
	Spectra 70/25	$ 7,000	9/65	2	2	4	X
	Spectra 70/35	$ 11,800	1/67	98	5	103	X
	Spectra 70/45	$ 22,600	11/65	266	18	284	X
	Spectra 70/46	$ 37,400	11/68	34	2	36	X
	Spectra 70/55	$ 34,900	11/68	6	2	8	X
	Spectra 70/60	$ 40,500	9/70	18	0	18	X
	Spectra 70/61	$ 47,200	3/71	10	0	10	X
	Spectra 1600	$ 3,600	1/69	67	0	67	X
	Spectra 70/2	$ 11,500	7/71	115	0	115	X
	Spectra 70/3	$ 18,900	10/71	19	0	19	X
	Spectra 70/6	$ 29,300	10/71	45	0	45	X
	Spectra 70/7	$ 36,300	10/71	22	0	22	X
	Subtotal			961	37	998	X
	Total			5,921	3,892	9,813	117
Xerox	Sigma-5	$ 11,500	8/67	265	60	325	X
	Sigma-6	$ 20,000	11/70	33	7	40	10
	Sigma-6E	$ 6,100	-	-	-	-	-
	Sigma-7	$ 24,000	12/66	100	25	125	X
	Sigma-8	$ 19,000	9/71	17	5	22	7
	Sigma-9	$ 44,000	11/71	32	7	39	14
	530	$ 3,500	8/73	60	5	65	NA
	940	$ 24,000	4/66	60	5	65	X
	9300	$ 8,500	11/64	30	5	35	X
	Subtotal			597	119	716	31
	TOTALS			62,247	44,540	106,787	13,239

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• A NEW FAMILY OF "NETWORK" COMPUTERS CALLED CYBER 170 -- designed to replace Control Data's four-year-old Cyber 70 line -- was introduced in Toronto last week, along with a new Network Operating System (NOS), and a completely unbundled price list that could offer new opportunities for independent software packagers. On both the hardware and software fronts, the announcement represented still another step along the path CDC charted for itself more than 10 years ago -- big computers for centralized processing in network environments.

The new family reaffirms CDC's aim to sell networking power. With NOS and a new microprogrammable communications processor, Cyber 170 systems can handle up to 512 remote terminals for batch, timesharing and transaction processing all at once. And CDC will be concentrating all its sales efforts on extensive network applications in science/engineering, financial data, process control, and other uses. The total unbundling policy means that users may purchase only the software features they need -- or none at all, if they want to design an entire system themselves. Typically, CDC estimates, software will account for about 25% of system costs.

On the hardware side, the 170 family retains the basic architecture of the ancestral 6600 -- 60-bit word length, heirarchical memory and phalanxes of peripheral processors -- but the machinery has been brought up-to-date with MOS main memory and fast ECL logic circuitry that combine to increase speed and cut cabinet sizes in half. CDC roughly compares the processing power of the four models announced -- numbered 172 through 175 -- to IBM Systems 370/155 through 168. The superscale 7600 series will continue to be the company's top-of-the-line family.

• MOST OF THE MAJOR MAINFRAMERS REPORTED HEALTHY GROWTH during the first three months of 1974, despite downturns in other sectors of industry. IBM earned $431 million on revenues of $3 billion, a per share increase of 25% over 1Q73. Burroughs reported earnings up 31% to $21 million on revenues of $323 million. Honeywell also reported record sales and earnings. NCR continued along the road toward recovery of profitability with a 62% increase in earnings . . . while higher revenues on Control Data's computer operations were offset by a drop in profits from its Commercial Credit subsidiary.

• ORAL ARGUMENTS IN IBM'S APPEAL OF THE TELEX DECISION -- and Telex's appeal of the $20 million counterclaim award -- will be heard before the Tenth Circuit Court of Appeals May 14 in Oklahoma City. All the appeal and reply briefs have already been filed, and the appellate court's decision is expected within 60 days of next month's session.

In its appeal briefs IBM attacked Judge Christensen's findings on just about every point. The giant still argues that the market for plug-compatible peripherals is not a single "relevant market" . . . that it does not hold or exercise "the economic ability to charge unreasonably high prices and to exclude competition" . . . that its price cuts were competitive rather than anti-competitive and did not stop independents from entering the field. To call its actions predatory, IBM insists, is "an attack upon competition and an assault on the very heart of the Sherman Act."

Telex, on the other hand, strongly contests the finding that it "stole" trade secrets from IBM. It argues that IBM's trade secrets are not protectible because IBM is a monopolist; that the "secrets" were public knowledge anyway; and that in any case Telex, far from stealing IBM designs, improved upon them. Telex also accused IBM of waging a campaign to suppress smaller competitors with specious suits alleging trade secret theft.

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INTERNATIOAL DATA CORP

MAY 6 - 1974

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 30,1974 • VOL.9,NO.14 P.J.McGOVERN,PUBLISHER

Culmination of the GE merger

HONEYWELL GETS IT ALL TOGETHER AND CALLS IT SERIES 60; NEW HARDWARE DESIGNED FOR GCOS; FIRMWARE ALLOWS MUCH COMPATIBILITY

"A new beginning" is how Honeywell's chief executive summarized the long-awaited announcement of the HIS Series 60 family of computer systems last week. And in a psychological sense, at least, he had a point. The new hardware in the small to large scale series blazed no new technological trails; the architecture and software were closely -- and carefully -- related to older products . . . but Honeywell at last seemed to have its house in order with a full line of related, up-to-date systems.

Designed around the functional characteristics of the successful Gcos operating system acquired with the GE merger in 1970, Honeywell's new line represents the culmination of a four-year effort to meld several product lines into a common family that would prove attractive to established customers as well as new users. And with its strong emphasis on easy conversion -- and multiple upgrade paths to just about any level of processing power (see page 2) -- Series 60 looks like a solid answer to user questions about where HIS is headed during the next decade.

The announcement includes entry and upgrade systems for small users in both the U.S. and Europe . . . plus a fully compatible line of 600/6000 successors. This reflects Honeywell's primary concern -- keeping current customers satisfied today and confident about tomorrow. And to emphasize that Series 60 is a growth path rather than a mandate for change, HIS says it will keep its 2000 (nee 200) and 6000 lines in production. Their capability is actually necessary, since the announcement last week at least temporarily left holes open in Series 60.

So, what did Honeywell announce hardwarewise? Among major elements of the new Series 60 are:

- Five "levels" of processing power, ranging from the 61/60 transaction oriented small business processor (for Europe only) to the 68/80, a very large multi-processing system replacing the 6180 for Multics.

- A single basic operating system, Series 60 Gcos, that spans the entire line. Small systems will use compatible subsets of Gcos, upgradable to full capability at levels 66 and 68. Software for the whole series utilizes a common Cobol, standard data formats, etc.

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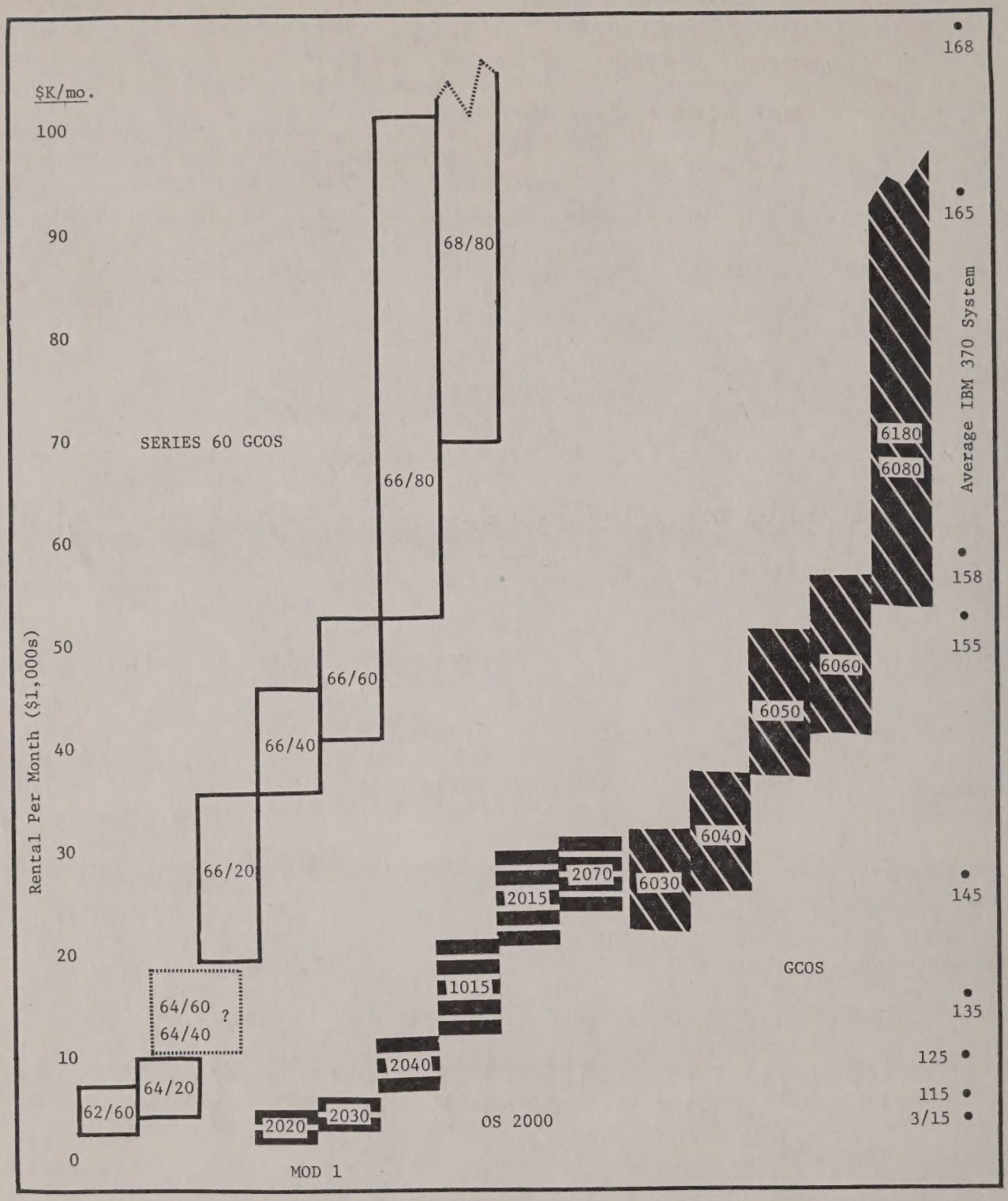

THE HONEYWELL FAMILIES -- The graph above shows members of the new Series 60 family on the left, scaled by rental ranges (no horizontal scale), and representatives of the established 200/2000 and 600/6000 lines on the right. As the graph indicates, Series 60 spans the entire range -- except for an undoubtedly temporary gap at the medium scale level. A "compatibility mode" is available for small system 200/2000 upgrades to Level 64, but users of the OS 2000 operating system are limited to conversion aids and language compatibility at present. Series 60 systems are completely compatible with all 600/6000 systems.

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- "Compatibility modes" -- implemented as microcode, or firmware -- to help users of small 200/2000 systems (and eventually some competitive systems) move over to Series 60 Gcos. Also, a variety of conversion aids and other compatibility modes are planned to complete the conversion of Honeywell users to Gcos, which is expected to remain transparent to future hardware changes in the Honeywell line.

- MOS memory and LSI circuitry -- used throughout Series 60 along with microprogramming (firmware) and stored logic for efficient execution of high-level instructions.

Three small models in the series will be built in Europe for new European users and the 5,000+ users of Model 58s and G 100s. Other systems to be marketed worldwide were designed in France, Italy, and the U.S. -- with Britain and West Germany pitching in on development of peripheral equipment. Four levels of processing power are available for U.S. users at present:

- Model 62/60, a small system configured for entry-level users or as an upgrade for Model 58 or small 200/2000 users. Renting for $3,500 to $7,000 per month, 62/60 is claimed to be competitive with IBM's System 3/15; it offers multiprogramming with dynamic memory allocation, communications controllers built into the central processor, and up to 131K bytes of main memory (as does IBM's 3/15).

- Model 64/20 is the small system in what will probably become HIS's medium-scale range. It offers twice the processor speed of the 62/60 and can run Mod. 1 200/2000 programs in compatibility mode while its users upgrade to Level 64 Gcos. Thus, Level 64 is a stepping stone to Series 60 software for small Honeywell users. This system will rent in the $5,000-to-$10,000 range, can have 131K bytes of memory.

- Models 66/20, 66/40, 66/60, and 66/80 are straight-forward, state-of-the-art successors for the 6000 line. Completely compatible with the older legacy from GE, these machines operate under Level 66 Gcos and simultaneously can handle local and remote batch processing, transaction processing, message switching, timesharing, interactive job entry, and on-line data entry . . . working from a common data base. Two new Datanet front-end processors provide extensive networking power. Designed to compete with IBM 370/145 through 168 systems, Level 66 models rent from $20,000-to-$102,000 per month. Memory capacities range from 328K bytes to 4 megabytes.

- Model 68/80 is designed for advanced, large-scale implementations of Multics, the security-oriented virtual storage operating system Honeywell obtained from work at MIT's Project MAC. (This university effort, started as a "machine-aided cognition" project some 10 years ago, gave virtual storage its first shot-in-the-arm and had a direct bearing on IBM's development of the 360/67 and probably influenced many concepts behind VS/370.) For the 68/80, Multics provides sophisticated memory management, file handling, security and communications for very large networks. It uses fast cache memory to increase speed and it handles very large (multi-billion-byte) data bases on line. Rentals, starting at $70,000, run 20% to 30% higher than equivalent-sized 66/80s; memory range of the top-of-the-line Series 60 machine is the same as the 66/80 -- up to 4 megabytes.

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Evolving a series around software

A theme common to other recent mainframe announcements seemed to emerge from the complexities of the Series 60 introduction. As Richard Douglas, a HIS marketing vice president, summed up: "It is a fundamental principle and strategy of HIS to announce new computer technology that uses existing software operating systems. Then, we evolve the software to use capabilities built into the new architecture."

Specifically, Honeywell has designed the entire Series 60 line -- and will base "all future" systems -- on the foundation of Gcos, the operating system developed by GE for the 600 Series and acquired by Honeywell when it bought out the GE computer business in 1970. Gcos was an ambitious project -- incorporating advanced multiprogramming and communications concepts -- and, with the bugs finally worked out, has proved to be possibly the single most valuable element Honeywell purchased from GE. Capabilities of Gcos have been a prime factor in the surprising success of the large-scale 600/6000 line now marketed by Honeywell.

Level 66 systems will handle "full" Series 60 Gcos functions -- batch, timesharing, remote batch, networking, transaction processing -- while smaller systems will operate under modular subsets of Gcos fully compatible with Level 66. This commonality and standardization -- all designed to eliminate major software conversion problems for the indefinite future -- extends to common high-level languages and data handling.

The overall Series 60 approach seems to consolidate some trends noticeable in other recent industry developments:

- LSI circuitry and semiconductor main memories have become the industry standard, providing steady hardware price/performance improvements. Control Data finally made the switch from discrete components with the announcement of its Cyber 170 series last month; Univac substituted MOS for plated wire memory in the 90/60 and 90/70 introduced last fall.

- Operating system capabilities and compatibilities are moving to the focus of system design projects (box, page 5). Users need easy conversion and upgradeability, common data base formats, and a variety of processing modes; all this requires highly developed, standardized operating systems. Increasingly, the configurations of these systems help determine hardware design. It may turn out that Honeywell's implementation of Gcos in Series 60 presages IBM's "Q" operating system made public in "Telex" documents (EDP/IR Jan.16,1974).

- Data security and "fail-soft" reliability -- permitting systems to keep running when individual components fail -- are increasingly essential to on-line users. Indeed, Honeywell stresses "RAM" -- reliability, availability, and maintainability -- similar to IBM's focus on "RAS" -- reliability, availability, serviceability -- with the introduction of System/370 in 1970.

A bit of unbundling

With Series 60, Honeywell also took the first step toward unbundling software and maintenance costs. While any charges for basic operating systems, job management and file systems, and basic "programming tools" remain buried in the system price, other software -- such as language processors, utilities, applica-

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From the eye of the storm

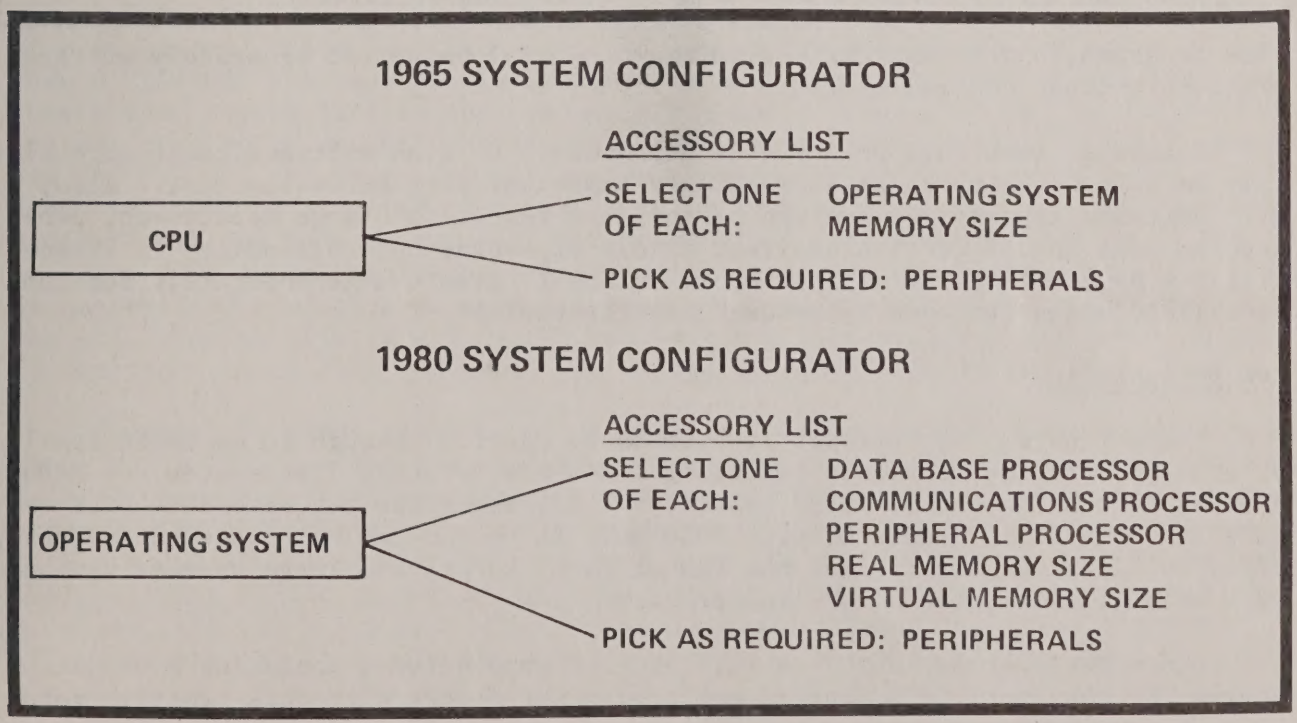
SOFTWARE PLAYS INCREASINGLY IMPORTANT ROLE IN NEW COMPUTER SYSTEMS

From the hardware or generation standpoint, 1974 might best be described as the eye of a storm for the computer industry. The hectic days of IBM rental base migration are past . . . but few users yet have tried to look over the horizon where exciting if not stormy days are brewing again. The significant force ahead, however, is software. To observers at International Data Corp., in fact, recent events indicate the possible dawning of a new era.

Already, users are justifying new systems to implement new applications that involve teleprocessing and manipulation of large data bases. A survey earlier this year verified results from 18 months ago . . . 60% of hardware acquisition is justified for new applications.

This is considered a reaction to, as well as a stimulus of the shift in focus by mainframers from hardware to software. New computer families take advantage of the latest hardware, to be sure. But when all the trimming is cast aside, it's software that is important. The "real System/370," virtual storage, was a software announcement . . . the latest Honeywell announcement is essentially a software announcement . . . the same arguments apply to recent offerings from Control Data and Univac (see text). Certainly the next major announcement expected from IBM -- the "Q" operating system -- will be a software announcement.

As food for thought, IDC has prepared a diagram, below, that summarizes the shifting emphasis in how computer systems are selected, or configurated. Today, about halfway through the transition, computer users are resting in a calm. Only time will tell the nature of the winds on the horizon. There is little doubt, however, that today's relative tranquillity will be disturbed. And the nature of the change that's abrewing will affect the industry. Think.



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Really NEW -- HONEYWELL'S SUPER-FAST, PAPER-SAVING, CLATTER-CUTTING PRINTER

In announcing Series 60, HIS adopted the more-or-less standard multi-part program with separate sessions for consultants, journalists, securities analysts, salesmen, customers, maybe even employees. To most, a computer is just that. So searchers for new sights were shown -- among the avalanche of products that might have been sitting there for months or years for all a tour would reveal -- a product that filled the bill. Something new. Really new.

The Page Printing System -- an off-line device governed by an integrated minicomputer with its own microprocesssor keeping track of details -- is an electrostatic printer of huge capacity. Reading from magnetic tape prepared by a Honeywell or any other general-purpose computer, the PPS prints and collates as many as 210 pages of copy per minute -- the equivalent of 18,000 lines per minute -- and manages to work almost noiselessly.

The machine forms characters -- as many as 512 different symbols in a variety of upper and lower case type fonts -- by depositing charges on electrosensitive paper. Basically, it's a matrix printer, but with 40,000 points/square inch, the matrix density is great enough to form well-defined characters considerably smaller than most impact printers produce. Thus, Honeywell puts as much printing, of higher quality, on a standard 8.5-by-11 inch page as does a drum or chain printer on standard 14-inch wide printout sheets.

Under microprocessor control, an automatic collator stacks up to 32 copies of an 800-page report in separate bins -- in two hours. Moreover, standard forms -- even company logos -- can be printed from changeable cylinders at the same time the variable information is produced; thus, no pre-printing is required. Purchase prices range from $162,000 for a 140-page/minute configuration up to $194,000 for the top-of-the-line 210-page/minute model. Rental charges, however, take a lesson from the copier industry . . . perhaps because Honeywell manufactures the paper: Minimum rent for a five-year contract is $6.72 per thousand feet up to 684,000, with a monthly minimum of $3,667.

tion programs, and communications software -- will be priced separately at rates similar to those charged by IBM.

Honeywell says this policy will allow users to plan software costs more flexibly as software becomes an increasingly important part of system cost. Also, with software expected to average 3%-to-5% of rental for large mainframes, perhaps as much as 15% for the smallest models of Series 60, this policy is essentially a page out of IBM's price book. HIS will also charge separately for compatibility modes included in hardware configurations.

New peripherals

The Series 60 "standardization" theme is carried through in an extensive line of common peripheral devices, including a new mass storage disk system for Level 66 that offers "double density" capacity of 235 megabytes per removable pack -- on a par with IBM's double density 3330 Mod. 11 -- and can be clustered in strings of up to 32 drives (four times the IBM maximum) to provide large systems with as much as 6 billion bytes of on-line storage.

Other peripherals include a full line of tape drives, including a cassette device for the operator's console and a high-speed unit with data transfer rates

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of up to 200,000 bytes per second. There's a high-speed belt printer that whacks out 1,600 lines (of 160 characters) per minute and an input document handler for the banking and retailing industries that reads a variety of fonts both magnetically and optically. But these classic peripherals were overshadowed by the introduction of Honeywell's new stand-alone Page Printing System. It prints up to 18,000 lpm electrostatically in a number of upper and lower case fonts, automatically collates the printed pages (box, page 6).

Marketing the Series 60

Purchase of GE's computer business in 1970 represented Honeywell's all-or-nothing gamble for a solid share of the burgeoning computer industry. Both Honeywell and GE had concluded that 10% or so of the market was the "critical mass" required for long-term viability, given the presence of IBM. Also, they recognized the impracticability of trying to "steal" that much of the pie by aggressive development and marketing of their own product lines. Thus, the merger of the customer bases and product families represented Honeywell's decision to commit itself to a major effort rather than withdraw from the market.

So far the gamble seems to have paid off . . . and Series 60 is Honeywell's bid to strengthen its position as the Number 2 mainframer on into the early 1980s. By dollar value, Honeywell shipped 8.7% of all computers made by U.S. mainframers in 1973, despite its aging and somewhat disorganized product line. And by year-end, it held 10.5% of the worldwide installed base manufactured by U.S. manufacturers (EDP/IR Apr.19,1974), having increased its installed base by more than 10% during the year.

With volume shipments of Series 60 scheduled to begin early in 1975, HIS has adopted a strategy it hopes will keep business moving, stimulating sales of most models in established lines. Many models of the 2000 and 6000 computers will remain in production, since backlogs exist; and for awhile, at least, the recommended growth path for many users will be within these families.

Helpful in "controlling" this desired customer movement will be the policy of a guaranteed trade-in price announced just a few months ago for users of purchased 200/2000 systems. It is designed to encourage purchase yet reassure customers that buying late in the product cycle won't leave them out in the cold when upgrade time rolls around. Worldwide, HIS currently owns only 46% of its computers (by value); the remainder are customer owned, or on third-party lease. Indeed, as might be expected of a manufacturer looking to announce a new round of hardware, it has been encouraging purchases since September of 1972, when three modified 2000 processors were offered on an attractive, purchase-only basis. For an unspecified time this policy will be continued, and extended to 6000 users, who will also be offered a $100,000 hardware box that will execute Level 66 Gcos instructions, much like IBM's DAT box allows 155s and 165s to run VS software.

Honeywell's prime concern, of course, is to keep established customers happy. About 80% of its current business now comes from existing users, much of the rest from people acquiring their first computer. For Honeywell -- as for all the mainframers with the possible exception of Burroughs (penetrating the System/3 base with its 700/1700s) -- winning customers from the competition is an increasingly insignificant factor in marketing. Even though it may attempt some conversion programs, the day has passed when Honeywell could make it big as a "liberator" of IBM users the way it really got its start some 10 years ago. Honeywell is staking its industry posture and survival on Gcos, now implemented in Series 60.

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• A FLURRY OF DECISIONS AND COUNTER-DECISIONS in the running legal battle between Ma Bell and MCI Communications Inc. this month sparked an almost comical frenzy of sabre rattling on both sides -- but once again, scrappy MCI came out on top. At least for the time being. AT&T's response to its latest setback in the interconnection dispute left little doubt that the communications giant is determined to take its case all the way to the Supreme Court before giving in once and for all to little MCI.

The latest go-round got underway two weeks ago when a Federal Appeals Court in Philadelphia overturned a lower court decision of December requiring Bell to let MCI private line customers connect to the MCI microwave network via Bell's foreign exchange and common control switching arrangements. The appeals court ruled that any such order would have to come from the FCC. Bell immediately sent out news releases demanding that all MCI customers disconnect as soon as "other arrangements" -- namely, the leasing of Bell lines -- could be made.

But within a week, as expected, the FCC formally ordered Bell to make the connections MCI needed -- serving notice that it is determined to make sure the specialized common carriers have some chance to compete and prosper. AT&T called the FCC decision "arbitrary and capricious" and petitioned for a court review of the ruling. Bell said the required interconnections could have a "substantial impact" on the operation and economics of its network.

• DATA COMMUNICATIONS TOOK ANOTHER STEP FORWARD in the U.S. this month when Western Union launched "Westar," the nation's first domestic communications satellite. The new satellite -- the first of two Westars planned for use in the immediate future -- multiplies WU's transcontinental transmission capacity several times over and is expected to cut the cost of coast-to-coast private lines by nearly half. The April 11 launching followed the FCC's decision to authorize domestic satellites by only 15 months.

Positioned in a stationary orbit over the equator due south of Dallas, Westar transmits conversations, data and television signals among ground stations near New York, Chicago, Los Angeles, Atlanta and Dallas. Potentially it can span the distances between Alaska, Hawaii and Puerto Rico from its vantage point in space.

Each of Westar's 12 transponders can carry 1,200 one-way voice signals, 50 megabits of data per second or one color TV signal. Service is point-to-point or point-to-multipoint via microwave land links from the earth stations to major cities -- but WU has indicated it will lease entire transponders to large users and allow them to relay signals from their own earth stations. Meanwhile, WU is upgrading its data service by adding digital facilities to its East Coast land network for interconnection with the satellite channels. First service is scheduled for late summer.

• NCR HAS INTRODUCED A $1,000 PER MONTH SMALL BUSINESS computer -- the Century 50/Mod 1 -- aimed primarily at accounting machine users who couldn't afford the jump to full-fledged computing. Marketing will be concentrated on small manufacturing companies, schools, local governments and small financial institutions. NCR spokesmen said they expect "substantial penetration of the lower end of the EDP market" with the new low-cost system.

The Mod 1 includes a low-speed line printer, card reader and dual disk unit, plus 16K main memory. It's fully compatible with the six larger Century systems and most of NCR's application packages will be available to Mod 1 users. Deliveries will begin in the fall.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 17,1974 • VOL.9,NO.15 P.J.McGOVERN,PUBLISHER

A user strikes back -- page 5

THE "SOFTWARE PROBLEM" IS A GROWING CONCERN FOR USERS AND MANUFACTURERS; NCC SPEAKERS OUTLINED MANY GOALS . . . OFFERED FEW SOLUTIONS

He who would do good to another must do it in minute particulars.
General Good is the plea of the scoundrel, hypocrite and flatterer.
For Art and Science cannot exist but in minutely organized particulars.
-- William Blake, 1757-1827

Closing his Goode Memorial Award acceptance speech with the 200-year-old quotation above, Dr. Edsger W. Dijkstra had just issued a "few notes of warning" as he declared that "we are in the midst of an exciting process of clarification, of improvement of our understanding of the true nature of the progamming task and its intrinsic difficulties." He was thoughtful, personal.

Dr. Dijkstra also had a few words to say about fame: "I think it can be a good thing. There are all sorts of things that should be said but will only be listened to when said by someone supported by fame . . . the famous have the responsibility to decide wisely when, where and how to open their mouths . . ."

Quite a few well known people seemed to be opening their mouths during 1974's NCC -- and the target of their concern made the choice of Dr. Dijkstra for this year's award seem more than fitting.

Along with a noticeable shift of emphasis this year toward end-users and their computer applications, the "software problem" seemed to loom more than ever into the focus of industry concern -- emerging almost spontaneously as an underlying theme of the conference. Amid the general enthusiasm for microprocessors, mini-peripherals and processing networks -- among other waves-of-the-present -- dissatisfaction with the current state of the programming art rumbled in audible undertones throughout the week. At times the rumblings sounded more like thunderbolts from Olympus.

The loudest thunderclap, in fact, was hurled on the first day by AFIPS president George Glaser, whose tough keynote speech accused the industry of being "machine mesmerized" to the point of ignoring the growing inability of the programming profession to produce enough good software. Glaser devoted his entire address to what is becoming widely known as "the software problem." And he concluded that the shortage of programming skills will hit manufacturers as well as users.

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FIRST MIDWEST NCC REFLECTS INDUSTRY PROGRESS . . . HOLDS NO SURPRISES

The personal and people implications of the computer industry might well be described as the theme of the second National Computer Conference that closed last week in Chicago. It was hard to compare the "Show" to previous ones, since its location was not in one of the heartlands of computer manufacturing activity. But comparisons must be made:

+ More people attended the "full" conference than in New York City last year (3500 to 2500); yet fewer came as exhibitor guests (9,000 to 15,000). This may reflect that a mid-continent location draws computer insiders well from both coasts, but doesn't attract as many casual observers -- or buyers.

+ The expanded technical program began to have its effect on the nature of sessions, with more and more of them reflecting practical solutions or challenges rather than "far out" abstractions.

+ The general mood was positive, even though fewer people attended (25,000+ compared to nearly 33,000 last year). The hall itself was bright and cheerful, and could have accommodated twice the crowd that actually showed up.

The business implications of the exhibit itself will only be determined as time goes by and companies chalk up their orders; there certainly weren't the obvious clouds of pessimism that hung over a pre-recession show the way they did at, say, Houston -- 1970. And the sessions showed what is in the works for the next few years. EDP/IR will be reporting on these developments -- including archival memories and microprocessors -- in forthcoming issues.

When, at midweek, the Goode Award went to Dr. Dijkstra for "his contributions to the scientific approach to computer programming, his efforts to establish programming as a science and a profession" -- the importance of his accomplishments actually seemed to underscore the problems still left to be solved. As he pointed out himself, progress to date "is being oversold."

In speeches, technical sessions, and panel discussions, different aspects of the software problem were mentioned and dissected again and again. The roots of the problem were traced to:

- The intangible quality of the programming process. In contrast to medicine and engineering, for instance, the programming art as yet has few foundations in theoretical science to build on. By the same token it lacks "professional" standards of education and practice.

- The fact that a "dismally large percentage" of the manpower engaged in programming ranges from "poorly qualified to incompetent," partly for the reason above, partly because of a demand that grew too fast.

- The rapid advances in programming and management techniques which lead to the quick obsolescence of programming skills already acquired.

- The tendency for programming and system analysis to be dead-end jobs within user organizations, offering little or no chance for long-term advancement to high-level corporate positions.

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In his keynote speech, Glaser pointed out that more than half the money spent on data processing each year now goes for personnel salaries -- including managers programmers and analysts -- and the gap between salary and equipment spending is growing wider. As hardware costs for storage and processing go down, programming costs-per-instruction keeps rising. Software costs currently average about $10 per line of code, according to one recent estimate.

Though the trend toward higher software costs hasn't been unexpected, Glaser made no apologies for quoting severe critics of the programming profession who claim that software costs far too much -- and is still unreliable -- because too many programmers don't know what they're doing. From Gerald Larson: "If 50% of the people involved in systems and software in the United States suddenly lost their jobs, not a single project would be delayed." And from Harlan Mills: "An honest and industrious lack of competence has produced a staggering overkill in cost and effort in programming."

Strong words indeed -- but the theme was taken up just as heatedly in many of the technical sessions on software. Martin Goetz, of Applied Data Research, said program development for users is currently in the "Dark Ages" and expressed the fear that the next generation of computer systems may be a "rocket without fuel" because of a dearth of good programming.

Everyone seemed to agree that a software problem certainly exists. But there was somewhat less unanimity on what to do about it. Vendors of packaged software, not surprisingly, expressed the view that widespread use of software packages would help a lot. But those who were called upon to spend money to improve software technology were quick to pass the buck. Industry accused educators of producing poorly trained programmers . . . educators accused industry of providing too little help . . . users accused programmers of tolerating their own unprofessionalism.

Looking for answers

Nevertheless, NCC conferees -- while they could offer no pat solutions -- did identify some general goals for the software industry to work toward:

- On the theoretical side, a systematic understanding of how programs accomplish their work. A real theory of computation would show, for instance, the minimum number of logical steps necessary to reach the answer to a given problem -- and thus give a measure of program efficiency. It would also suggest techniques for "proving" programs to avoid bugs. As Dr. Dijkstra put it, "What we are called on to design will get so sophisticated that Elegance is no longer a luxury, but a matter of life and death."

- Standards for the design and documentation of programs. Basic design flaws and poor documentation were identified as a major reason why current software takes so long to develop and so often needs repair.

- Language standards to simplify development and result in transferability of programs among machines without conversion.

- Measures and standards of performance. Many managers today don't know what they have a right to expect from the programs they order, let alone how much time and money it should take to write them. Generally, yardsticks for software development don't exist.

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- Educational standards for programmers and analysts. These would require better academic offerings for would-be programmers -- courses aimed at the practical side of the art and the latest techniques -- instead of the all-too-common training in Fortran for the 1401 -- and an emphasis on education continuing throughout the programmer's career.

One organization that's taking a serious look at the software problem is the Department of Defense. DOD is the largest user of computers in the world -- and it has the bureaucratic muscle to enforce standards among its legions of programmers. A workshop of software development managers for the military concluded this year that most working-level programmers aren't aware of "the contributions which currently available techniques and tools can provide" and find it hard to express just what it is they need to help them do better.

As a start on this facet of the problem, the workshop members recommended a nationwide study of programmers to find out what kinds of projects they're working on and what kinds of help they could use. At the same time the group recommended that ARPANET or some other network-based facility be established to exchange new programming ideas and check military software standards.

Small user applications

Probably no group feels more helpless in the face of the software problem than the small user of business-oriented applications. The Catamore Enterprises suit against IBM (see box on opposite page) vividly illustrates the plight of the small user with no DP experience who buys a small system -- often with application packages from the manufacturer -- and then finds the software doesn't do what it's suppposed to.

The problem -- and the question of liability -- has been growing more acute since the late 1960s, when the big manufacturers began peddling small systems to businesses with no EDP background. In many cases the manufacturer planned to supply application software based on programs developed for similar customers -- and the suppliers may have been far too quick to assure small customers that their systems could be operated without in-house computer expertise.

Will packaging help?

Independent software houses are convinced they can offer one partial solution to the problem of small business applications software -- especially since the mainframers seem to be moving further toward separate pricing of software and maintenance. Representatives of the independent software industry attending NCC were optimistic about the future.

"The software industry is finally a viable, independent, identifiable industry," said Goetz. "The high time and money costs of in-house development are not the only problems playing havoc with computer users. Programming of systems is a shoddy, unreliable, uncontrolled process with much duplication and low productivity."

Tested packages from independents, he said, are a realistic solution for small users. Goetz claimed both independents and mainframers have come a long way since the late '60s, "when every program was touted as a package." According to L. A. Welke, president of International Computer Programs, packages are developed now as products rather than mere adaptions of custom software -- and monthly payments with built-in maintenance agreements are a growing software trend.

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A SMALL USER STRIKES BACK

Even as the software critics were lining up their soapboxes in Chicago, a small jewelry company in Rhode Island was drawing its own bead on the software problem -- by suing IBM for more than $60 million.

On May 9th, while the elegant multi-media show at IBM's big booth in Chicago was showing spectators how IBM is "reflecting people's needs," a jewelry manufacturer called Catamore Enterprises filed a counter-suit against the Giant in Rhode Island Federal Court. Catamore claimed that faulty application software and false promises from IBM had resulted in huge losses to the company. The counter-suit -- filed in response to an IBM suit for recovery of $250,000 in unpaid computer rentals -- was the first user suit charging IBM with anti-trust violations.

The fate of the Catamore suit -- barring a settlement -- could have some precedent setting effects on IBM's already precarious legal situation (see page 8). But legalities aside, Catamore's tale of woe clearly shows that software headaches aren't unique to users who try to go it alone.

As Catamore tells the story, its troubles began when it first started discussing the installation of a small computer in 1967. No one at the company knew anything about computers. But IBM, the company claims, told Catamore it would need a computerized accounting system to stay competitive in the jewelry business -- and promised to supply a turnkey system based on a Model 360/20. IBM would supply all the applications software and train Catamore's accounting department employees to run it. IBM salesmen also insisted that IBM was the only vendor who understood the business well enough to do the job.

Meanwhile Catamore decided to expand by acquiring other jewelry businesses. And IBM sold Catamore on the idea of implementing a complete management information system to help insure successful growth. Before any of the system was operating, Catamore claims, it had embarked on a long-range growth plan -- partly to help pay for the new computer system. And IBM decided its customer would need a bigger 360/25, soon to be replaced with a 360/30.

After many delays -- and after Catamore had converted its entire inventory and accounting system to the "IBM code" -- the initial system was finally delivered in 1970. By then IBM had decided that Catamore couldn't get along without in-house DP experts,so Catamore obediently hired several people chosen by IBM.

But, Catamore now claims, the system didn't work as promised. The suit charges that the software provided failed to produce totals on sales reports, printed incorrect billing charges, failed to report inventory and overshipments by suppliers, etc. IBM also failed to supply enough documentation for Catamore to fix the bugs. As a result, Catamore says, it lost "millions" in overcharges, lost customers and additional costs for manual processing.

In pressing its anti-trust charge, the company claims IBM is not primarily in the manufacturing business, but is mainly a "lessor of computer equipment and of systems consulting and software development . . . such that the customer . . . is necessarily required to utilize IBM's services in connection with software development and systems maintenance . . . resulting in exclusion of competitors to the detriment of the customer."

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The optimism of the independents seems well-founded. P.J. McGovern, publisher of EDP/IR, reported to an NCC session that outside software expenditures by users -- though they represented only 2% of total DP outlays in 1973 -- are growing by nearly 50% a year. That's in contrast to overall industry growth of 16% in 1973.

McGovern also pointed out that software vendors in future will be writing packages more to suit specific operating systems than specific mainframes -- following the trend toward more concern for operating system capabilities than hardware muscle (EDP/IR April 30, 1974). Greyhound Computer, according to President Ollie Swanky, has already made an explicit commitment to this policy with software teams preparing to write application packages for modular "Future Systems" when IBM puts them on sale.

Trends in software

Growth in the demand for more sophisticated and elaborate software capability during the past five years has been rapid -- so rapid, in fact, that IBM and the other mainframers have been caught somewhat by surprise. Data base and data communications software is in general demand and the next few years should see "full-scale penetration" of such systems into users' computing rooms, according to an IBM spokesman at the conference.

Independents and even large users are generating new ideas in this area at a steady rate. A team of analysts from the largest electrical utility in Brazil came to NCC with a scheme to build data base administration right into the operating system -- ultimately making inquiry and update functions a direct extension of the operating system's basic access method modules.

Among the major current trends for the next few years:

- Small users at the System/3-DOS level will avoid implementing their own applications -- as they have in the past -- and buy packaged applications from their vendors and independents.

- Larger users will be buying data base/data communications capabilities, utilities and operating system enhancements, but will write their own application software.

- On-line administrative systems for order entry and similar commercial functions will come into widespread use, paralleling the growth of autotransaction networks.

- There will be increasing use of information (text) handling systems side by side with the traditional number-juggling operations.

- A healthy market for security and auditing packages, system monitoring packages, automated programming aids and other specialized housekeeping software seems to be developing.

Several conferees expressed the fear that users may become distracted from the "central problem of applications" by the vast array of secondary choices they need to make. The ends of EDP, they fear, are being lost from sight amid the thicket of available means: mainframes vs. minis, centralized vs. distributed systems, in-house vs. timesharing, do-it-yourself vs. packaging, batch vs. on-line, and so on . . . and on.

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A MINI MANUFACTURER AIMS AT THE BUSINESS WORLD

Take a minicomputer . . . add 40 megabytes of "virtual storage" . . . throw in a dash of microprogramming for System/3 emulation . . . and give it a command language that any literate 10-year-old can use from any one of up to 32 CRTs . . . and Microdata claims you've got a mini-based turnkey data management system that's just what the business world's been waiting for. Microdata calls its elaborately cross-bred new animal "Reality" -- and hopes the system will be its stepping stone away from the crowded technical/process control OEM market into the new world of end-user mini systems. At least it gave visitors to McCormick Place something fun to play with.

Designed to give commercial users on-line file creation, inquiry and up-date capabilities for fairly sizable data bases, Reality represents a fresh and determined effort to bridge the application gap -- IBMers are calling it the "usability gap" these days -- between general purpose hardware and the myriad peculiar needs of unsophisticated users.

Only time will tell whether users are really ready for Reality -- or whether it's what they really need. But other mini makers are likely to be looking over Microdata's shoulder as it tests its new marketing philosophy. As Donald Fuller, president, explains it, Microdata thinks it needs about 5% of the mini business -- or $100 million a year -- for long-term viability. Rather than try to compete solely in the OEM market -- now 80% of its business -- Microdata hopes to win its 5% share with end-user systems sold through exclusive independent dealers throughout the country. The systems will be for sale only -- to eliminate cash flow problems and the headaches of managing a lease base.

To avoid major applications-support problems at the outset, Reality is being peddled to large, experienced firms such as All-State, which uses it for claims processing; Bank of America for credit cards; the government of Canada for passport processing. With the help of such large accounts Microdata says it expects to double earnings this year and next -- and increase the end-user percentage of its business to 40%.

The black art of microprogramming

The art of microprogramming -- "the implementation of logic through memory" is one definition we like -- came in for a lot of discussion on the exhibit floor, mainly because microprogramming capability is the latest sales pitch of such mini makers as Hewlett-Packard, Microdata, etc. Hewlett-Packard ran full-house seminars on the topic twice a day -- and microprogramming enthusiasts from academia expressed disappointment that only one technical session was scheduled on the subject. But even they, in general, admitted that microprogramming isn't practical for most users -- and the art is likely to flourish only in the back rooms of the hardware builders. High-level languages have been developed for "firmware," but the mainframers don't want to provide applications support for microprograms.

For the next generation . . .

The ultimate solution to the software problem -- as IBM and others believe -- may not come until system control software, languages and data handling abilities become so sophisticated that users can communicate with machines almost effortlessly -- and without the intervention of programmer-logicians. That day is a long way off. But when and if it comes . . . another revolution will be underway.

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• NOBODY AT THIS YEAR'S NCC TOOK THE "USER" THEME more seriously than the Computer Industry Association, which climaxed its second annual NCC press conference with an offer of $50,000 to help start an organization of computer users. The only strings attached to the grant were that two other groups put up equal amounts of seed money and that user members be represented by top managers of their respective institutions.

CIA -- a group of 36 non-mainframe manufacturers "which seeks free and open competition in the computer and telecommunications industry dominated by IBM and the Bell System monopolies" -- said it hoped to see the establishment of "a strong, unaffiliated user group as a step toward restoring the balance of power in what today is the most important industry in America." Pointing to the "dominance of the supplier" in the EDP industry -- meaning the mainframers and Ma Bell in general and IBM and Ma Bell in particular -- the association of smaller manufacturers obviously believes a user group might be a powerful ally in its lion-taming efforts.

But in airing its proposal, CIA stopped short of a recent suggestion by Dr. Herbert Grosch, editorial director of Computerworld, who called upon major users to form an association, chip in development money and design their own computer family for manufacturers to build.

• ORAL ARGUMENTS IN IBM'S APPEAL OF THE TELEX DECISION last week in Oklahoma City brought some embarrassing questions for IBM from the three appeals judges. Lawyers for IBM repeated their argument that the "relevant market" in peripherals includes computer systems from all mainframers -- that the market for IBM-compatible peripherals is not competitively isolated. But if so, one judge wanted to know, then why didn't other mainframers lower their peripheral prices when IBM decided to?

In general, observers felt the three-judge panel was thoroughly familiar with the lower court's findings -- and showed no signs of feeling that Judge Christensen's decision was unusual, strange or precedent-setting. In fact the marked absence of any encouraging signals toward IBM started renewed speculation that the Giant will try to reach a quick settlement with Telex before the appeal decision is handed down. A ruling is due within 60 days -- and many onlookers expect it may come much sooner.

• KEEPING UP THE MOMENTUM OF ITS DRIVE INTO THE AUTOTRANSACTION market -- a market it is not only competing in but helping to create -- NCR announced three new terminals for the banking industry last week. NCR clearly hopes the new products will be among the stars of the show at the automation conference of the American Bankers Association in San Francisco this week.

The company describes its 279 as the "smallest on-line universal financial terminal available in the industry." A user may install the device as a stand-alone intelligent teller terminal and later upgrade it for on-line use. Cost of the off-line model is $2,375. The NCR 770 is a programmable service terminal (autoteller) that accepts deposits and payments in addition to dispensing cash after-hours. The third new offering is a credit verification terminal.

Now among the four top information appliance suppliers -- and second in banking -- NCR is plainly determined to be ready with a full range of offerings as the POS market burgeons toward an all-encompassing national Electronic Funds Transfer System. After a difficult transition from the mechanical cash register business, the company is now positioned to push hard into supermarkets, hotels, retailing and other consumer industries.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 30,1974 • VOL.9,NO.16 P.J.McGOVERN,PUBLISHER

A "storage revolution" in the offing?

HOT COMPETITION BETWEEN NEW TECHNOLOGIES EXPECTED AS MASS STORAGE SYSTEMS PREPARE TO ENTER COMMERCIAL MARKET

"Mass storage" -- a term once applied to auxiliary disk systems and tape libraries -- has taken on a distinctly new meaning during the past few years. New devices -- announced largely in response to needs first felt by the federal government -- can store a trillion bits or more on line . . . several hundred times the capacity of the largest disk systems now offered.

This new breed of mass storage systems represents much more than oversized extensions of secondary on-line memory, however. The systems should probably be viewed as first-generation, "dinosaur-age" specimens of future electronic record-keeping memories that will evolve somewhat independently of computers themselves. Eventually, they may rival the large-scale computer in their impact on human life. But just what that impact will be is as impossible to predict at this time as was the future of the computer in the early 1950s. (Some people today seem to think that one or two dozen of these vast memories will satisfy all application needs.)

It seems quite clear to EDP Industry Report that only in putting mass memories to use will people discover their potential. In this article, EDP/IR looks at the mass storage systems already available or announced. A forthcoming story will survey the outlook for new memory technologies currently under development.

A number of quite different technologies are competing in the mass storage market today -- reflecting the fact that memory technology is one of the most active areas of technological competition in the computer field. Present systems, however, have some basic characteristics in common:

- Full configurations will store about one trillion bits on-line (i.e., accessible without manual intervention), though most are available in smaller sizes, allowing modular growth.

- Data is stored and retrieved in sequential blocks, each of which contains at least one megabyte. Average access times (see page 3) for the first block in a series range from 10 to 100 seconds.

- Cost per bit ranges from 0.001 to 0.0001 cent -- between 100 and 1000 times cheaper than drum or disk storage . . . and several times less

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expensive than standard tape in some cases. But attempts to use these mass storage devices for data bases smaller than 50 billion bits generally is uneconomical because of the high fixed costs of implementing such systems.

Originally, the motive for developing mass storage systems was the need to handle efficiently the mountains of computer output -- mostly on magnetic tape -- generated by government computing centers. Agencies such as the IRS, Census Bureau, Department of Defense, and Social Security Administration faced record-keeping problems that far exceeded those of any corporation except possibly AT&T. Thus, the first mass stores were developed for such systems as DOD's Tablon -- a mixture of photo-digital and videotape data stores serving many different computers . . . and expected to hold 1,000 trillion bits on-line within 10 years. That is the equivalent of five million reels of magnetic tape!

The prospect of such capacities excited a good deal of blue-sky speculation about more general mass storage applications and their future effects on society. But so far, few mass storage systems have been delivered to commercial users. And when they are, their first applications will be fairly mundane: the replacement of huge, cumbersome tape libraries containing insurance records, bank records, seismic data, and the like.

The question of whether businessmen are really ready to put mass storage to use -- and whether current technology really offers cost-effective ways to do it -- remains unanswered. Implementing mass storage in a business environment will demand a good deal of initiative from large users . . . plus sizable investments in software and record conversion.

First-generation mass storage

The five mass storage systems announced to date utilize various technologies, and definitely might be compared to the computer systems of the mid-1950s insofar as sophistication is concerned. Here's a run-down on announced products:

• Ampex Terabit Memory(TBM), a system developed from videotape technology. The TBM stores data on standard videotape reels that hold 43 billion bytes each. A maximum configuration of 64 tape transports and associated controllers can hold nearly three trillion bits on line. Recording is done with a high-frequency analog signal from a rotating head, yielding far higher densities than standard discrete-bit magnetic recording. The first Ampex system is now used in Tablon.

• Grumman Masstape, which resembles a "jukebox" of tape cartridges. Tapes can be combined to total a trillion bits with an average access time of 10 to 13 seconds to any file. The first Masstape systems were originally promised to customers for last year, but problems with the reliability of the mechanism have delayed deliveries until late 1975. The first Masstape will be used in Grumman Data Services' own computer center.

• Control Data Scroll, now in the prototype stage. This system is essentially a single tape transport of heroic proportions. Scroll handles one interchangeable tape at a time . . . but each tape is 12 inches wide and 3000 feet long, providing enough recording surface for a trillion bits. The tape is divided into 30-inch segments, each holding one file. The read/write technique used in Scroll is possibly its most interesting feature: Recording heads are imbedded in the surface of a drum rotating at 3,500 rpm. One segment of the tape at a time is looped

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MASS STORAGE SYSTEMS

	Bit capacity	Average access time	Data transfer rate megabytes/sec.
Ampex TBM	3 trillion	15 seconds	3.0
Grumman MASSTAPE	1 trillion	13 seconds	1.2
CDC Scroll	1 trillion	17 seconds	4.5
Precision instrument Unicon	1 trillion	9 seconds	4.0
IBM 1360	1 trillion +	8 seconds	2.5

around the drum for reading and writing while the tape remains stationary. Thus, Scroll behaves like a rotating drum memory with a rapidly interchangeable recording surface. Air bearings throughout the mechanism prevent the tape from making any physical contact with the transport, keeping wear and tear to a minimum.

• Precision Instrument's Unicon, the first commercial laser storage device. Data is recorded on strips of coated film by a scanning laser that vaporizes microscopic holes on the film surface. Unicon is an "archival" memory -- once data is recorded, it cannot be erased. Reading is done by re-scanning with the laser at lower power. The first trillion-bit Unicon is serving as a mass store for Illiac IV. The fact that its storage is non-erasable will no doubt limit its usefulness in many on-line applications, but it seems to offer one of the most compact and inexpensive ways to store machine-readable records yet developed. Cost-per-bit in full scale systems is reportedly less than 0.0001 cent -- cheaper than storage of paper documents.

• IBM 1360 Photo-Digital Store, developed during the 1960s. This system is no longer in production. The 1360 stores data in read-only form on light-sensitive film. Very high recording densities yielded a true mass-storage system -- but the recording rate was a very slow 30,000 bits per second and an elaborately automated wet-chemical process was required to develop the film. Two 1360s are currently in use within the Tablon system for storing infrequently used records.

Data by the acre

Interestingly enough, most of these systems are based on established magnetic recording techniques rather than on radically new electronic technology. They are essentially mechanical attempts to provide reliable access to microscopically small points on recording surfaces on the order of an acre in size. Exactly the same effect, of course, could be accomplished by linking hundreds of disk spindles or tape drives . . . but the expense obviously would be too great for the applications for which mass memory is designed, and the access times much faster than necessary for infrequently used files.

For the near future, especially for memories of this sort, improvements are likely to come primarily from increased recording densities. Higher density reduces the size of the recording surface required for mass memory, easing the problem of mechanical read/write positioning. On the mechanical side, these machines

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-- with their 1000 inches-per-second tape speeds, air bearings, and oversized parts -- already push the state of the art close to its foreseeable limits.

Within a few years, at any rate, non-mechanical memory technologies now in development will probably relegate these devices to dinosaur status. Meanwhile, many basic questions remain about the appropriate role and implementation of mass storage . . . no matter what technology is used:

- "Fully transparent" sharing of data by all types of computers among all types of mass memories will be essential in the future. On-line archives will be too expensive to duplicate in different formats just to satisfy the needs of different processors or users. The concentration of huge stores of data will serve as common links among computers and force the adoption of common data handling standards. Memory networks will incorporate translation processors so as to present "transparent" interfaces to different computers.

- The organizing of large stores presents new problems for systems architects. Automated "foreground/background" memories, for example, might incorporate supervisors that gradually push little-used data into the least-accessible regions of memory while moving heavily used data to the forefront. New techniques for file indexing and associative structures could increase the usefulness of mass stores significantly.

- The concentration of vast numbers of vital records within one machine will present unprecedented security problems. The destruction of a mass store by accident or sabotage could be catastrophic to a user; recovery procedures will be an essential part of mass storage systems.

Where's IBM?

If users prove wary of the mass storage concept, one reason will be IBM's low profile. Having abandoned the 1360 -- probably the entire photo-digital storage concept as well -- the Giant has given no hints that it will produce a marketable mass storage system any time soon. It has given clues as to why it may not.

To start with, IBM is deeply committed to disk technology. During an NCC session on mass storage earlier this month, a General Products Division analyst talked a lot about disks . . . pointing out that disk installations of 100 billion-bit capacity already exist, and holding out the likelihood that a ten-fold increase in disk recording density within the near future will make terabit disk installations feasible. With that kind of capacity available from an established and familiar technology -- with much higher access speeds -- disks and mass storage devices might find themselves in a "stand-off" competition.

"Many installations will approach mass storage through disk evolution," the IBMer said. Asked whether he was implying that IBM, for its part, intended to ignore mass storage and protect its "hotcakes" business in disk drives, he replied only that "no one should find any implications in what I said."

It is quite clear, in any case, that IBM is deeply and openly interested in such advanced non-mechanical storage techniques as laser scanning and magnetic bubbles. The Giant may well have decided to keep pushing its disk technology as far as possible -- through another product cycle -- convinced that bubble and laser stores will be ready when disks can no longer fill the growing need.

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

The data below was compiled from the best information available to the International Data Corporation, and much has been verified by the manufacturers. Any questions or comments should be directed to Census Editor Walter Misdom. Dedicated application (Group B) computers are defined as those commonly called minicomputers, plus certain larger systems designed primarily for one application -- such as process control, data communications, and data entry. Group B computers are typically word oriented (8, 12, 16, or 24 bits per word), usually sold outright, and predominantly programmed in machine language.

Definition becomes increasingly difficult, and subjective judgment is often necessary when considering specific machines. For example, "office accounting computers" ("visual record computers" in Europe) -- such as Burroughs' E and L Series or TC-500, Litton/ABS 1200 series, NCR-399, Nixdorf 820, and Singer 5800 -- are excluded; included, however, are "data entry" oriented such as Eldorado 140, Four Phase, and MAI's Basic Four since they compete with other "minis," yet do not fit EDP/IR's definition of General Purpose (Group A) computers.

The Census that follows contains 315 unique models from 83 manufacturers, as compared with 175 models in the First Group B Census published Jan.1, 1970. Of the models listed, 139 are "out of production," leaving 176 currently manufactured.

AS OF JANUARY 1, 1974

NAME OF MANUFACTURERS	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Adage	AGT-10 Series						4/68	32	3	35	X
	AGT-100 Series			4	100	165	1/72	14	7	21	7
	400			2	30	37	1/74	-	-	-	1
Apeco (Cascade)	80/20	*	8	2	28	35	1/70	]	]	]	X
	80/30	*	8	2	31	40	1/70	] 215	] 10	] 225	X
	80/40	*	16	3	46	57	1/70	]	]	]	X
Autonetics	Recomp-II		40	4	95	127	11/68	30	5	35	X
	Recomp-III		40	3	65	94	6/61	7	2	9	X
Bailey Meter	750		25	4	40	110	6/60	37	15	52	X
	755		25	4	80	330	11/61	7	2	9	X
	756		25	4	90	150	2/65	15	12	27	X
	855/15		16	4	24	135	12/72	5	0	5	NA
	855/25		25	4	100	400	4/68	16	0	16	X
	855/50			4	100	400	3/72	15	0	15	NA
Bendix	BDX-6200		20	2	25	60	5/70	40 +	0	40 +	NA
	BDX-9000		16	1	6	15	/71	8 +	0	8 +	NA
Bunker Ramo	130		15	3		90	10/61	160	27	187	X
	133		15	4		108	5/64	79	9	88	X
	230		15	4		134	8/63	15	2	17	X
	300		29	4		275	3/59	18	5	23	X
	330		29	4		275	12/60	19	7	26	X
	340		29	4		375	12/63	19	3	22	X
	1018		18	1		23	12/71	NA	NA	NA	NA
Cincinnati Milacron	CIP-2000 series	a	8	1	4	12	7/69	485	0	485	NA
Clary Data Comp.	404	*	16	2	6	30	1/70	100 +	20	120 +	NA
Collins Radio	8311			1	15	17	1/68	NA	NA	NA	NA
	8400			4		950	11/62	25	8	33	X
	8500		32	4	200	1000	1/67	53	16	69	X
Compiler Systems Inc.	CSI-16		16	1	11	20	11/70	80 +	0	80 +	NA
	CSI-24		24	2	15	30	12/70	30 +	0	30 +	NA
Computer Automation Inc.	108/208/808		8	1	5	11	4/68	280	30	310	X
	116		16	1	8	16	8/70	100	10	110	NA
	216		16	1	8	20	7/69	340	40	380	NA
	816		16	1	10	15	12/68	40	5	45	X
	Alpha-8		8	1	3	4	5/72	]			
	Alpha-16		16	1	4	9	10/71	] 1,000	135	1,135	NA
	Naked Mini-8		8	1	2	3	5/72	]			
	Naked Mini-16		16	1	3	7	10/71	] 500	70	570	NA
	Alpha-LSI		16	1	2		12/73	-	-	-	NA
	Other							1,550	200	1,750	NA
	Total							3,810	490	4,300	NA
Computer Development	CD-2000		8	1	7	10	8/70	NA	0	NA	NA
Computer Logic Systems	CLS-18		18	1	9	14	3/71	NA	0	NA	NA
Computer Signal Processors	CSP-30		16	4	85	120	6/70	10 +	0	10 +	NA
Comtec	CT/90		16	3	50	85	1/72	NA	0	NA	NA
Comten Inc.	10			1		17	7/69	70	0	70 +	NA
	20		16+2	3		80	3/71	90	0	90 +	NA
	40		32+4	4	125	240	8/69	30	0	30 +	NA
	60		32+4	4	150	365	9/69	20	0	20 +	NA
Consultronics (Sc. Control Corp.)	600 Series		24	3	31	80	10/65	230	0	230	X
	4700		16	3	15	72	4/69	18	0	18	X
	DCT-132		8	2	28	36	5/69	75	65	140	X
Control Data Corp.	160		12	4	60	112	5/60	49	11	60	X
	160-A		12	4	90	225	7/61	200	65	265	X
	160-G		13	4		535	3/64	34	1	35	X
	924/A		24	4		430	8/61	26	1	27	X
	1700		16+2	4	37	160	3/66	290	180	470	X
	1700-SC		16+2	3	20	60	9/70	150	130	280	X
	System 17		16+2	2	14	39	2/74	-	-	-	NA
	8090		12	3		90	5/64	116	89	205	X
	8092		8	3		67	6/64	56	14	70	X
	G15		29	3		61	7/55	265	30	295	X
	LGP-21		32	2		42	12/62	140	35	175	X
	LGP-30		32	3	49	59	8/56	290	43	333	X
	RPC-4000		32	4	87	101	10/60	61	12	73	X
	CSC-46/136/636		15	4		280	/54	27	3	30	X
	Elbit-100		12	1	6	8	6/67	5	445	450	X
	M-1000		24	4	250	365	/68	20	0	20 +	NA
	Totals							1,729	1,059	2,788	NA
Datacraft Corp.	6024-1		24	4	51	135	5/69	20	0	20	X
	6024-3		24	3	32	90	2/70	100	25	125	Neg
	6024-4		24	3	24	100	8/73	19	2	21	NA
	6024-5		24	2	16	50	5/72	77	23	100	30

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AS OF JANUARY 1, 1974

NAME OF MANUFACTURERS	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Data General Corp.	Nova		16	1	8	11	2/69	740	610	1,350	Neg
	Nova-800		16	1	7	10	3/71	820	150	970	120
	Nova-820		16	1	6	9	4/72	370	65	435	90
	Nova-840		16	2	16	50	7/73	85	15	100	NA
	Nova-1200		16	1	5	10	12/70	2,570	530	3,100	550
	Nova-1210/1220		16	1	4	8	2/72	2,000	500	2,500	750
	Nova-1230		16	1	7	15	12/71	165	35	200	NA
	Supernova		16	1	9	14	4/70	170	70	240	Neg
	Supernova-SC		16	1	14	19	6/71	130	70	200	Neg
	Nova-2/4		16	1	4		10/73	80	20	100	250
	Nova-2/10		16	1	15		10/73	60	15	75	210
	Totals							7,190	2,080	9,270	1,970 +
Datamate Computer Systems	DM-16		16	2	17	26	11/69	12	0	12	X
	DM-70		16	1	9	15	12/70	25	0	25	NA
	DM-70/ROM		16	1	4	6	10/70	NA	0	NA	NA
	ECP-18		18	1	14	15	11/66	12	0	21	X
	2400		24+3	1	15			NA	0	NA	NA
Data Technology	1600		8	1	6	22	9/68	NA	0	NA	NA
Digiac Corp.	3060			1	9	13	1/70	86	0	86 +	NA
	3080		25	1	20	25	12/64	16	0	16 +	X
	3080-C		25	2	26	37	10/67	8	2	10	X
Digital Computer Controls	D-112		12	1	3	12	8/70	1,020	235	1,255	850
	D-116		16	1	3	12	2/72	1,385	145	1,530	
Digital Equipment Corp.	PDP-1		18	4	120	136	11/60	35	6	41	X
	PDP-4		18	3		74	8/62	30	3	33	X
	PDP-5		12	2	30	36	9/63	62	29	91	X
	PDP-7		18	3		66	11/64	69	46	115	X
	PDP-8, i,l,s		12	2	8	27	5/65	5,745	3,650	9,395	X
	PDP-8/e,f,m		12	1	4	12	4/71	7,815	3,840	11,655	2,150
	PDP-8/Linc		12	2	38	48	9/66	88	46	134	X
	PDP-9 & 9L		18	2	35	50	12/66	300	170	470	X
	PDP-11/05 & 15		16	1	5	10	4/71	3,135	1,255	4,390	825
	PDP-11/10, 20 & 40		16	2	9	28	4/70	2,930	1,220	4,150	575
	PDP-11/35		16	1	6		11/73	130	30	160	300
	PDP-11/45		16	3	15	75	7/72	700	250	950	350
	PDP-12		12	2	13	45	4/69	500	240	740	80
	PDP-15		18	3	15	75	2/70	415	220	635	80
	Totals							21,954	11,005	32,959	4,360
Digital Scientific Corp.	Meta-4		16	3	29	100	4/70	75	0	75 +	NA
Dynamic Research	DR4-44		24	2		36	7/68	NA	-	NA	NA
Eldorado	140/200	*	8	2	18	30	1/70	300	0	300	NA
Electronic Associates Inc.	640		16	3	27	55	6/67	110	61	171	X
	1020		16	1	20	25	2/64	100	25	125	X
	8400		32	4	200	450	6/65	21	8	29	X
	Pacer-100		16	2	15	40	5/72	65	55	120	NA
Electronic Processors Inc.	EPI-118		18	1	3	14	11/70	NA	0	NA	NA
	EPI-218		18	1	4	14	1/72	NA	0	NA	NA
EMR	210		12	4	94	132	4/62	9	0	9	X
	420		42	4	324	450	6/63	3	0	3	X
	2100		21	4	65	143	12/63	8	0	8	X
Foto Mem Inc.	Centauer-100		8	1	6	20	4/70	20	0	20 +	X
Four Phase Systems	IV/40		24	3	16	55	6/73	100	0	100	NA
	IV/70	*	24	3	16	60	3/71	500	0	500	NA
Foxboro	Fox-1		24	4	95	260	10/72	NA	NA	NA	NA
	2/10		16	2	30	50	11/72	NA	NA	NA	NA
	2/20		16	3	50	100	9/72	NA	NA	NA	NA
General Automation Inc.	GA-18/30		16	2	18	50	7/69	365	60	425	NA
	SPC-12		8	1	4	16	1/68	1,850	250	2,100	NA
	SPC-16		16	1	8	25	5/70	1,515	205	1,720	NA
	Totals							3,730	515	4,245	NA
GE/PAC	30	b	8	1	7	25	5/69	140	20	160 +	NA
	312		20	4		200	3/60	27	6	33	X
	412		20	4		300	7/62	39	8	47	X
	3010	c	16	3	13	90	5/70	25	1	26	X
	3010/2	d	16	4	15	140	12/71	NA	NA	NA	NA
	4010		24	4	76	200	10/70	30	4	34	NA
	4020		24	4	79	250	2/67	200	60	260	X
	4040		24	4		120	8/64	45	20	65	X
	4050		24	4		280	12/66	23	3	26	X
	4060		24	4		340	6/65	18	6	24	X
	4070		24	4	300	1000	NA	NA	NA	NA	NA
	4401		24	4		235	9/74	-	-	-	NA
	4402		24	4		500	NA	-	-	-	NA
	Totals							547	128	675	NA
GRI Computer	909 Series		16	1	4	9	1/70	295	55	350	NA
	99/30		16	1	5	15	6/72	270	30	300	NA
	99/40		16	1	6	17	6/72	70	5	75	NA
GTE (Tempo)	I		16	2	14	36	12/69	90	10	100 +	NA
	II		16	1	6	10	1/72	50	0	50 +	NA
	IS/7000		16	1	6	15	2/72	NA	NA	NA	NA
Hewlett Packard	2000-A	f	16	4	89	101	11/68	165	55	220	X
	2000-B	g	16	4	119	134	8/70	35	15	50	X
	2000-C		16	4	187	205	3/71	220	10	230	40
	2000-E		16+1	3	50	75	7/72	55	30	85	30
	2000-F		16	4	110	137	7/72	105	10	115	40
	2007-A	h	16	2	20	40	9/68	10	10	20	X
	2100-A		16	1	7	15	6/71	3,320	1,850	5,170	1,030
	2100-S		16	2	16	35	8/73	200	100	300	450
	2114-A		16	1	10	16	5/68	450	310	760	X
	2114-B		16	1	9	15	10/68	265	185	450	X
	2115-A		16	2	15	26	11/67	240	100	340	X
	2116-A		16	2	22	32	11/66	265	200	465	X
	2116-B		16	2	24	40	8/68	450	255	705	X
	2116-C		16	2	20	45	11/69	180	95	275	X
	2123-A		16	1		21	2/74	-	-	-	NA
	3000		16	4	100	185	11/72	35	5	40	30
	Totals (i)							5,405	3,100	8,505	1,510
Honeywell	19		19	4		140	5/61	3	0	3	X
	21		20	3		63	2/66	41	25	66	X
	24		24	4		200	5/63	82	3	85	X
	112		12	1	5	10	11/69	222	48	270	X
	116		16	3		65	4/68	172	35	207	X
	124		24	4	65	130	3/66	109	18	127	X
	224		24	4	75	380	3/65	55	8	63	X
	290		18	4		175	11/60	10	2	12	X
	316		16	2	8	45	6/69	1,440	560	2,000	NA
	324		24	4	175	250	7/68	12	0	12	X
	416		16	2	17	43	4/67	198	130	328	X
	516		16	3	24	95	10/66	865	285	1,150	X
	632		32	4	97	450	12/68	10	4	14	X
	700 Series		16	3	16	53	6/72	710	190	900	NA
	164X Series	j	16	4	144	440	12/69	20	8	28	X
	Totals							3,949	1,316	5,265	NA
IBM	1710/1720		6	4		225	2/62	8	12	20	X
	1800		16+2	4	47	235	2/66	585	390	975	X
	System/7		16	3	17	60	11/71	2,000	500	2,500	1,000
	Totals							2,593	902	3,495	1,000
Imlac	PDS-1	*	16	1	10	11	2/70	NA	0	NA	NA
Information Technology Inc.	4900/5		8	1	3	3	10/70	NA	0	NA	NA
	4900/10		16	1	10	20	10/65	25	0	25	X
	4900/20		12/32	2	30	50	10/69	20	0	20 +	NA
Infotronics	Mini/Maxi		16	1		25	7/70	NA	0	NA	NA

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Interdata	1		8	1	4	11	9/70	235	85	320	X
	2		16	1	11	14	7/68	20	0	20	X
	3		16	1	13	20	5/67	200	5	205	X
	4		16	1	9	21	8/68	300	125	425	X
	5		16	1	11	25	11/70	80	20	100	X
	15		16	2	22	35	9/69	40	24	64	X
	16/18		16	2	15	30	8/71	3	13	16	X
	50		16+1	1	7	19	4/72	55	15	70	NA
	55		16+1	2	16	40	8/72	40	10	50	NA
	70		16	3	9	65	12/71	500	125	625	NA
	74		16	2	3	34	2/73	85	20	105	NA
	80		16	2	15	44	7/72	25	5	30	NA
	85		16	3	23	60	7/73	7	1	8	NA
	7/16		16	3	3		2/74	-	-	-	NA
	7/32		32	3	10	73	5/74	-	-	-	NA
	Totals							1,590	448	2,038	NA
Interplex	System-1		16	2		47	9/70	NA	0	NA	NA
Kesne Associates Inc.	System/4	*		3		65	11/71	125	0	125 +	NA
Linolex	Model A	*	8	2	10	30	8/72	75	0	75	NA
Lockheed Electronics	MAC-16		16	1	11	22	3/69	315	35	350	X
	MAC-Jr		16	1	8	16	1/71	1,030	170	1,200	NA
	Sue-111X		16	1	6	10	9/72	300	30	330	NA
MAI	Basic Four	*,e	8	3	25	46	8/71	390	310	700	NA
Memorex	MRX-40	*	16	4	91	180	8/72	18	18	36	X
	MRX-50	*	16	4	104	250	8/72	8	12	20	X
Microdata Corp.	400		8	1	3	4	1/70	140	0	140	NA
	800		8	1	5	8	6/69	575	145	720	NA
	810		8	1	6	10	5/69	395	130	525	NA
	912		8	1	11	15	12/69	300	95	395	NA
	820		8	1	6	13	10/70	1,035	560	1,595	NA
	1600 Series		8	1	5	11	2/72	485	135	620	NA
	3200		16	1	5	10	10/73	10	0	10	NA
	3230		16	1	8	16	10/73	10	0	10	NA
	32/S		16	1	10	20	3/74	-	-	-	NA
	Totals							2,950	1,065	4,015	NA
Mini Comp.	Administrator-2		16	3	35	52	12/70	NA	0	NA	NA
	MD-708		8	1	5	7	8/70	50	0	50 +	NA
	Multi User-E		16	3	67	85	11/70	NA	0	NA	NA
	Multi User-I		16	3	40	58	1/71	NA	0	NA	NA
Modular Computer Systems	Modcomp-I		16	1	2	9	10/71	415	0	415	NA
	Modcomp-II		16	1	4	22	3/71	255	0	255	NA
	Modcomp-III		16	2	13	44	12/70	115	0	115	NA
	Modcomp-IV		16/32	3	19	89	1/74	-	-	-	NA
Monroe	XI	*	32	2	21	28	5/60	250	200	450	X
Motorola Comm. Div.	MDP-1000		8	1	8	19	2/69	75	0	75 +	NA
	MC-6800		8	1	5						
Nanodata	QM-1		18	4	75	150	/73	NA	NA	NA	NA
Nuclear Data Inc.	ND-812		12	1	7	15	3/71	435	10	445	NA
Omnicomp Computer Corp.	Omnus-1		16	1	8	12	8/71	NA	0	NA	NA
Omnitec (BIT)	480		8	1	6	17	12/66	195	3	198	X
	483		8	2	9	33	1/70	115	40	155 +	NA
Philips	P 850 Series	*	16	1	3	15	4/71	131	NA	131 +	NA
Prime	100		16	1	4	6	4/73	39	23	62	NA
	200		16	1	6	18	11/72	22	13	35	NA
	300		16	3	12	63	9/73	8	4	12	NA
Qantel Corp.	Qantel-V	*	8	2	14	30	6/70	300	0	300	225
	Answer	*	8	2	12	27	5/72	NA	NA	NA	NA
Raytheon Data Systems	703		16	1	13	23	10/67	175	35	210	X
	704		16	1	10	18	3/70	330	115	445	NA
	706		16	2	19	30	5/69	75	17	92	X
	PB-250		22	2	33	48	12/60	115	20	135	X
	PB-440		24	4		140	3/64	20	2	22	X
	PB-520		24	4		128	10/65	26	1	27	X
	RDS-500		16	1	8	14	12/73	-	-	-	NA
	Totals							741	190	931	NA
Redcor Corp.	RC-70		16+2	2	15	30	7/68	125	15	140	X
Rolm Corp.	1601	k	16	2	13	28	3/70	455	60	515	NA
	1602	k	16	2	18	26	2/73	110	0	110	NA
Sanders	Series-200		16+2	4	57	120	3/69	NA	NA	NA	NA
	Series-800		16				12/71	NA	NA	NA	NA
	MIP-16		16	2	15	30				NA	NA
Spear	Microline		12	3	46	57	6/66	33	3	36	X
Spiras Systems/USM	65		16	2	19	40	8/69	25	2	27 +	X
Sys. Computer Corp.	500		8				6/72	NA	0	NA	NA
	1000		8	1	4		1/71	400	0	400 +	NA
	1500		8				6/72	NA	0	NA	NA
Systems Eng. Labs	810		16	2	38	45	9/65	24	6	30	X
	810-A		16	3	18	90	4/67	236	10	246	X
	810-B		18	4	30	150	12/68	168	10	178	X
	840		24	3	65	80	11/65	3	0	3	X
	840-A		24	3	60	75	8/66	36	4	40	X
	840-MP		26	4	49	260	12/67	33	0	33	X
	71		16	2	15	48	8/72	230	70	300	NA
	72		16	2	20	45	8/70	32	10	42	NA
	85		32	4	150	240	7/72	13	2	15	NA
	86		32	4	200	325	6/70	37	5	42	NA
	88		32	4	350	600	3/71	4	1	5	NA
	Totals							816	118	934	NA
Tenet	210		32	4	200	385	8/71	NA	0	NA	NA
Texas Instruments	960		16	2	14	30	6/70	400	0	400 +	X
	960-A		16	1	3		11/71	585	0	585	NA
	980		16	2	17	40	5/68	300	0	300 +	X
	980-A		16	1	4		5/72	105	0	105	NA
	Totals							1,390	0	1,390	NA
Unicom, Inc.	CP-8A		8	1	3		2/70	108	15	123	NA
	CP-8B		8	1	3		3/70	77	10	87	NA
	CP-8C		8	1	5		3/70	139	19	158	NA
	CP-8D		8	1	7		6/70	20	2	22	NA
Unicomp, Inc.	Comp-16		16	2	11	29	6/70	26	0	26	X
	Comp-18		18	2	12	38	8/70	38	0	38	X
Univac (EMR)	6130/6135		16+2	4	85	200	3/66	60	38	98	X
	6140/6145		16	4	60	120	/73	NA	NA	NA	NA
	6020		24	4	72	175	4/65	13	3	16	X
	6040		24	4	98	225	7/65	9	1	10	X
	6050		24	4	123	360	2/66	17	6	23	X
	6070		24	4	240	600	10/65	1	3	4	X
Varian	520/i		16	1	6	13	9/68	350	150	500	X
	620/a		16	3		75	12/65	135	15	150	X
	620/f		17+1	1	11	25	6/70	210	40	250	X
	620/f-100		16	1	10	27	6/72	168	32	200	65
	620/i		16+2	1	10	20	6/67	1,220	80	1,300	X
	620/L & L00C		16	1	5	12	2/71	610	160	770	70
	620/L-100		16	1	6	14	6/72	410	90	500	165
	R-620 & 622/i		16+2	2	15	29	6/69	180	20	200	X
	V-72				10		2/74	-	-	-	NA
	V-74				40		3/74	-	-	-	NA
	V-73		16	3	13	75	11/72	106	8	114	55
	Totals							3,389	595	3,984	NA
Varisystems	PAC-16	l	16	1	4		9/69	20	0	20 +	NA
Wang Labs	3300 Basic		8	2	14	40	4/71	80	0	80 +	NA
Westinghouse	P-50		14	1	16	23	8/64	203	19	222	X
	P-250	m	16	3	40	62	9/67	58	10	68	X
	P-500 Series		18	4	85	110	6/63	39	6	45	X
	P-2000		16	2	10	27	8/69	157	44	201 +	NA
	2500		16	2	10	30	11/71	135	20	155	NA
	Totals							592	99	691	NA
Xerox	92		12	3		90	4/65	40	10	50	X
	910		24	4		120	8/62	170	10	180	X
	920		24	4		130	9/62	110	20	130	X
	925		24	4		200	12/64	10	4	14	X
	930		24	4	80	400	6/64	100	25	125	X
	CE-16 & A		16	1	8	23	6/69	40	5	45	X
	CF-16 & A	n	16	1	8	17	11/70	80	5	85	15
	Sigma-2		16	4	24	125	12/60	210	40	250	X
	Sigma-3		16	4	28	140	1/70	200	70	270	30
	Totals							960	189	1,149	45
XLO	Eight		8	1	4		1/71	50	0	50 +	NA
TOTALS								76,709	25,063	101,772	NA

* primarily sold as "small business computer" and/or "intelligent terminal/data entry"

a. cross-licensed version of Microdata-800
b. cross-licensed version of Interdata-1
c. cross-licensed version of Interdata-4
d. cross-licensed version of Interdata-70
e. including Microdata-1600
f. utilizes 2116-B
g. utilizes 2114-B or 2116-B
h. utilizes 2115-A or B (Educ. Basic System)
i. excluding 2000 and 2007 "system" configurations avoid double counting
j. utilizes two H-316's
k. cross-licensed, ruggedized version of DG/Nova
l. Manufactured by Photon, Inc.
m. utilizes Xerox - Sigma 2
n. utilizes CAI-116

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• INTERNATIONAL COMPUTERS LIMITED (ICL) HAS AGREED to join NCR and Control Data as an equal partner in Computer Peripherals Inc., a joint manufacturing and development venture formed in 1972 by the two U.S. mainframers. ICL's $20 million investment will include manufacturing facilities in the U.K.

The European partnership should benefit NCR and CDC by giving them new overseas manufacturing capabilities free of import taxes, as well as increasing CPI's overall product volume and locked-in business. CPI makes equipment only for sale to its parent companies. ICL stands to gain from the economies of joint production in addition to bolstering its peripherals offerings -- traditionally a weak point in European computer families.

The agreement won the approval of both the U.S. and British governments -- after Parliament had rejected a bid from Burroughs to acquire a direct interest in the British firm. The pact brought speculation that other European manufacturers might join the CPI partnership -- CII, for instance, which already has ties to the other three mainframers through Multinational Data.

• MORE NEWS FROM THE INTERNATIONAL SCENE . . . Sperry Rand, following in the footsteps of Control Data, signed a cooperative agreement with the Soviet Union's State Committee for Science and Technology. Described unofficially as "an agreement to agree," the document covers computers as well as farm machinery, office equipment and other products.

Just what the "cooperation" will consist of wasn't spelled out. A Sperry Rand spokesman said the Soviets have expressed interest in acquiring an 1106 system with control software -- if the U.S. government is willing to relax its position against allowing computer exports to socialist countries. Univac is also one of several mainframers jockeying for a large reservation system contract with Aeroflot, the Soviet airline.

On the cooperation issue, the agreement expresses the "sincere desire" of both sides to exchange technical information and products, the company said. Sperry is currently holding a one-company exhibition in Moscow and conducting technical seminars about its products for Soviet officials.

• THE GENERAL SERVICES ADMINISTRATION and the Department of Agriculture say they're "reviewing" their plans to develop a massive, nationwide data processing network. The review comes in the wake of "concern raised in several quarters of government" over the implications of the proposal for individual privacy, according to GSA.

The two agencies announced in February they plan to phase out 50 computing centers across the country and combine their data processing functions in a single vast network, replacing the old hardware with "more cost effective and reliable systems." The resulting request for proposals from manufacturers represented one of the largest computer procurement packages in history.

• THE GSA REVIEW OF SECURITY PROBLEMS suggests that mainframers with the best handle on the security problem may have an edge from now on when it comes to winning major network contracts. And nobody's presenting a stronger security-minded image than Giant IBM. Users attending NCC this month packed a large auditorium to hear reports on a two-year, IBM-sponsored field study of computer security. The study report -- available this summer -- runs to 1.300 pages in six volumes and IBM says it offers "practical, field-tested" guidelines for the protection of data stored in computer files.

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INTERNATIONAL DATA CORP.
JUN 14 1974
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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JUNE 13, 1974 • VOL.9,NO.17 P.J.McGOVERN,PUBLISHER

The next generation of memories -- page 4.

DEC ANNOUNCES A "NEW WAY OF DOING BUSINESS:" COMPONENTS, PERIPHERALS AND TERMINALS FOR OFF-THE-SHELF DELIVERY

Digital Equipment Corp., the "grande dame" of minicomputer manufacturers, served notice to the computer community this week that it's not ready to rest on its marketing laurels. Coming full circle from the day it took its legendary step from component supplier to inventor of the mini, DEC has decided to the time is ripe for a return to the computer component business. But this time around, "components" will include terminals, peripherals and logic devices.

The new marketing scheme is designed to take advantage of DEC's high-volume manufacturing capabilities and the growing sophistication of OEM's and large users. It represents a "major commitment," according to DEC, which took in $262 million last year for a 32% share of the minicomputer market.

Last week's announcement was clearly designed to make a "splash" . . . and gave DEC a chance to show off its sumptuous new facilities in Marlboro, MA., purchased from RCA's defunct computer division at a fire sale price. The rural complex will be headquarters of the new Digital Components Group, an "independently functioning unit" of DEC headed by Vice President Andrew Knowles.

In essence, the DEC plan involves setting up a chain of minicomputer component "supermarkets" where high-volume customers can buy "iron" off-the-shelf -- without service, software or maintenance. What's more, the company plans to design new terminal and peripheral offerings especially for low-cost, high-volume production and independent sale.

Some of the reasons behind DEC's new venture:

- The booming mini market is already generating systems business faster than DEC and other manufacturers can handle it. Meanwhile, OEMs and large users are saying they can do their own system design and software -- and would like to buy bare hardware at high volume discounts without the overhead costs of systems design and bundled software.

- The demand for networks and autotransaction systems is creating a huge market for low-cost terminals and peripherals, such as the new CRT DEC has introduced for less than $1,000. DEC plans to use its new

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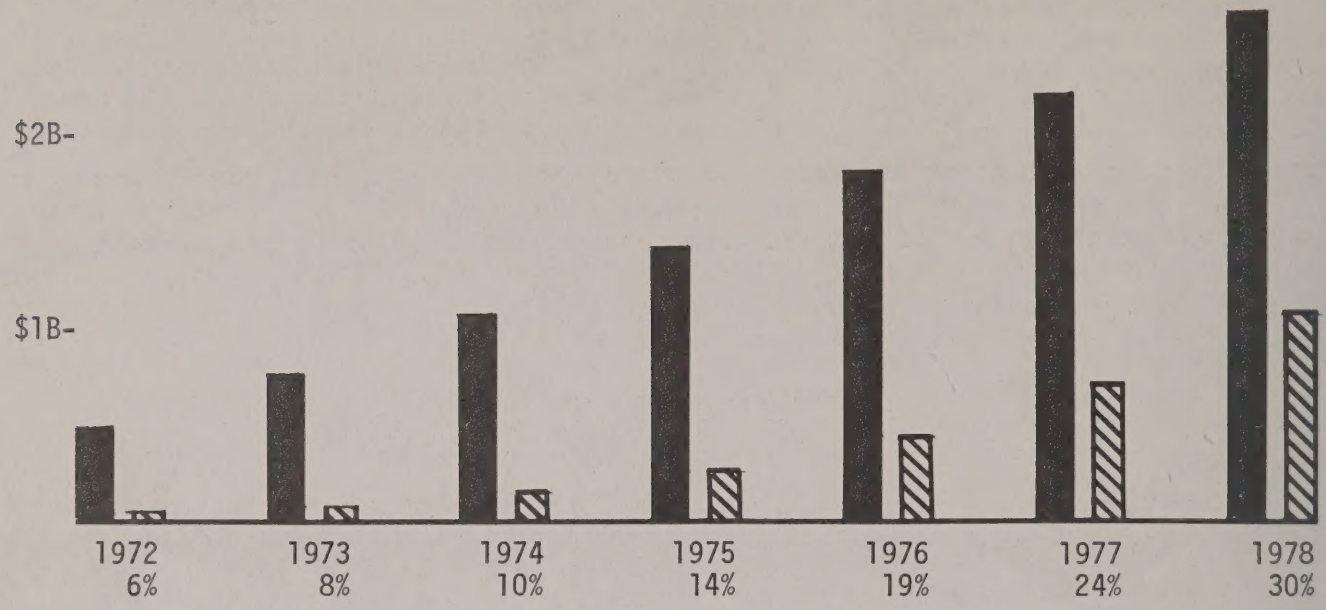
WORLDWIDE SHIPMENTS OF TURNKEY SYSTEMS AND DEDICATED APPLICATION COMPUTERS
(Estimates and Forecasts Copyright 1974 by International Data Corporation)



GROWTH OF TURNKEY SYSTEMS built around minicomputers (shaded bars) will be more rapid than that of dedicated application (primarily mini) computers, as the percentage figures below each year indicate. The figures can't be compared directly, however, since turnkey systems include peripherals and are priced to include software and other systems value added by the supplier, often a systems house

component sales organization to get a foothold in the independent peripherals market. It will compete across-the-board with the specialized independents who make CRTs, printers, and tape products.

- DEC, first mini maker large enough to tool for high-volume production, wants to capitalize on this competitive advantage. It is preparing, for example, to turn out low-cost CRTs by the "thousands per month."

DEC plans to implement its supermarketing idea with warehouses located in the west, midwest, and east -- plus one in Western Europe. An automated ordering and delivery system is being set up to insure fast service. Items will be sold with a 30-day warranty -- but any software and maintenance will have to be negotiated independently between the customer and other DEC divisions.

It could be described as the "ultimate unbundling." And in becoming the first mass merchandiser of the full spectrum of mini system components, DEC believes it will make some noticeable changes in the user marketplace:

- Immediate, large-quantity availability of low-cost components should mean greater flexibility for end-user system designers. DEC expects to see its lower costs reflected in applications for reservation networks, automated order entry, credit verification, and the like.

- OEM's can re-evaluate the make-or-buy decision for terminals and processing components. This could cut the initial investment required to undertake production of new systems -- an important factor in light of today's shortage of investment capital and high interest rates.

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President Kenneth Olson says this "new way of doing business" is just the first of a variety of new marketing concepts DEC expects to evolve from the Component Group. Ultimately -- if the idea is successful and is copied by other suppliers -- it might even lead to a more clearcut stratification of the currently fragmented market for "intelligent" devices and systems.

As EDP/IR sees it, much of this confusion and lack of structure observers see in the mushrooming mini business stems from the unresolved question of "Who is best suited to do what?" The system designer's expertise is becoming more and more application-unique as general purpose data processing components are increasingly used in systems that are more and more specialized -- systems for controling machine tools, cash registers, traffic lights, for example.

In other words, minicomputers are becoming components themselves. And mini makers may find themselves taking a rather well-defined place -- at last -- in the heirarchy leading from the most device-specific manufacturers (the integrated chip suppliers) to the most application-specific system suppliers (of airline reservation systems, etc.)

Mini manufacturers may find their place in this hierarchy producing discrete component assemblies -- processor boards, electromechanical devices, etc. -- with general purpose characteristics. These would be passed on to systems houses and and OEMs for incorporation into application-specific systems, and finally on to the end user.

To some extent, of course, this progression is already common. But a good deal of competition still exists among the different "strata" for control of various parts of the value-adding process. Mini makers in particular still seem unsure how much of the turnkey system market they can handle on their own. And DEC, among others, is still pondering a possible move downward into the semiconductor manufacturing business.

What's in the cupboard

The new VT50 DECscope, introduced in a double ceremony with the Components Group, is the first of the high-volume terminal products DEC will market. Priced at $950 in lots of 100, the interactive CRT is especially designed for low-cost and low maintenance on large networks. And it's available with built-in hard copy printout for "less than $500 more." The electrolytic printer shares electronics with the CRT and needs no inks or toners. The 9600 baud CRT screen fills up in one second, but a paper copy takes 18 seconds.

The Group also demonstrated a prototype improved version of DEC's 30 cps printer-terminal. The new matrix printer offers upper and lower case fonts and presumably a low price, but neither price nor delivery date have been announced.

Other components include existing peripherals and logic devices. These will be ready for sale when DEC opens its supermarket next month:

- Dual cassette tape memories, 30-character data entry terminals and higher performance 64-character terminals.

- Processor components, including microprocessor modules, 1K to 4K random access memory modules, PROMs, external event detectors, PDP-8/A computer boards and solid-state logic modules.

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Demise of the disk in sight?

NEW MEMORY TECHNOLOGIES ARE HEADING FOR A MARKETPLACE BATTLE; DEVELOPERS PROMISE RADICAL ADVANCES DURING THE NEXT DECADE

The memory market is bustling these days. Semiconductor memories -- though they haven't displaced magnetic core as rapidly as proponents were predicting a few years ago -- have taken hold and become a standard for main storage. Costs are falling geometrically . . . while independent core manufacturers claim their market is holding strong as ever.

Disk memory is firmly entrenched as the mainstay of the secondary storage market -- and the growing use of virtual storage, multi-processing and vast on-line data bases is steadily expanding the demand for disks and drums. IBM alone will ship more than a billion dollars worth of disk products this year. And traditional magnetic tape storage remains a staple of the DP diet as the technology is continuously refined. Nothing has yet come along that's more effective at the price -- or as familiar to users.

Can anything new ever push aside these deeply entrenched, highly developed technologies? Within the last couple of years, a number of radically new techniques have reached the prototype stage in various corporate laboratories. Some of them appear nearly ready to compete cost-effectively with tape, disks or core — or the whole gamut at once -- and generally they offer far more room for future improvement than the mature magnetic recording techniques.

- "Domain tip" and magnetic "bubble" devices are now in field use. These non-mechanical devices combine integrated circuit packing densities with the simplicity of magnetic storage, promising higher speeds, almost perfect reliability and lower costs than disks.

- Charge-coupled memories, also integrated circuit devices, should offer faster speeds than bubbles at lower cost than current transistorized semiconductor chips.

- Electron beam memories have been prototyped for the military. These devices combine chip technology with electron beam scanning for read/write operations. The director of Stanford Research Institute's electron beam project says he believes such memories could be marketed by 1977 with the capacities of fixed head disks . . . at one tenth the cost and a thousand times the speed. The search for a commercial developer is underway.

- RCA and other laboratories have demonstrated laser-optical memories that store data in holographic images. Potentially they could store vast numbers of records at very low cost -- and achieve faster access times than rotating memories. But commercial versions won't be practical until better lasers and recording media are developed -- and by that time the other technologies may have too much of a head start for optical memories to catch up. RCA has put its project in mothballs for the time being.

Each of these methods has its enthusiasts. And in some applications they will complement rather than compete with one another. But in each case, proponents believe their entries in the race could far outperform the entire gamut of

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on-line mechanical memories in cost, speed and reliability. Can just one of the new technologies push the established methods aside and steal the whole pie? It's probably too soon to answer that question in terms of the future cost/effectiveness of the new memories -- but it's worth noting that there may not be room in the memory market for more than one major technology at a time, within a given cost/access time catagory. Development costs are so high and volume production so economical that the first technology to gain a significant edge is likely to quickly outstrip the others in price/performance. And in this industry . . . a "significant edge" means anointment by IBM.

Bubbles regain their fizz

A lot has been written about the potentials of magnetic domain ("bubble") memories since they were first conceived at Bell Laboratories a decade ago. The theory looked beautiful: storage densities up to a billion bits per square inch; no moving parts; non-volatile storage; speeds, capacities and reliability several orders of magnitude higher than disk systems of comparable cost.

But when it came to building such a memory, problems cropped up. Experimenters had trouble growing the crystal films they needed. The bubbles were hard to read efficiently. At times -- with other technologies showing great promise and established devices improving steadily, magnetic bubbles seemed to have fizzed out.

But today -- in the wake of several improtant breakthroughs -- excitement over bubbles seems to be taking off again. Major bubble memory development projects are in full swing within several major corporations and the junior mainframers are keeping a close -- and no doubt apprehensive -- eye on IBM's extensive bubble work:

- Bell Systems recently announced it has put a 500 kilobit bubble memory into field operation in its telephone network. The compactness and reliability of bubbles makes them outstanding candidates for telephone system use.

- North American Rockwell is putting together specifications for the mass production of bubble memories for the Army. Like Ma Bell, the military sees bubbles as ideal for rugged field use -- and the Army is developing an extensive array of "intelligent" combat systems.

- IBM -- the other major bubble enthusiast -- is working hard to improve basic bubble technology. Whether it plans to produce a marketable device by the time "Future Systems" are ready -- say in 1977 or so -- is a dark secret. The Giant is clearly committed to disks for at least several years to come -- and that's a big investment to guard.

Making it simpler

Bubble memories store data in the form of mobile "domains" of magnetic force within thin films of material deposited on silicon chip surfaces. It was originally believed that only crystalline thin films could contain useable domains -- and growing these crystals was one of the severest technical problems confronting the experimenters. But a year ago IBM researchers announced a new discovery -- they had found useful domains in an amorphous (non-crystalline) substance. The amorphous film was easy to deposit on a chip; it opened the possibility of fabricating chips with only one masking step and increased the potential storage density of bubble memories.

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In today's rotating disk and tape memories, magnetized spots are carried past a sensing head on a moving medium. The machinery is complex and built to close tolerances -- and thus is prone to breakdown and wear. The need for mechanical motion limits speed. But in bubble memories, areas of magnetization move through the medium under the guidance of outside magnetic fields -- so there are no moving parts to wear out or slow things down.

Bubbles can be made very small. In fact, if the outside magnets are strong enough they can be shrunk almost without limit. The number of bubbles you can squeeze onto a single chip at present is limited only by how small you can build the permanent magnets implanted on the chip to guide the bubbles in their endless march past the read/write points.

To put some numbers on all this:

- Bell's current demonstration chips hold 20K bits cycling at 100K bits per second. IBM has announced a 1K chip cycling at 500K bits/sec.

- At present, both disk and magnetic bubble recording densities have reached about one million bits per square inch. A bubble memory containing enough chips to equal one large disk system would cost about ten times more than the disk system. But increases in storage density don't affect chip cost very much -- so IBM experts estimate that bubble memories will become cost competitive with disks when storage densities roughly 10 times greater than disks are achieved. Since engineers think disk recording densities may be improved by another order of magnitude before a practical limit is reached, a broadly competitive bubble memory might have to have a density of 100 million bits per square inch.

- Using the beam of an electron microscope to "draw" the implanted magnets on a chip surface -- a process IBM has successfully tried in the laboratory -- bit densities of as much as a billion bits per square inch can be achieved, according to IBM scientist Hsu Chang. Foreseeable improvements could raise that to 100 billion per square inch (at that point exceeding the storage density of the human brain.)

Bubbles can't move as fast as electricity -- so bubble memories will never match the speed of all-electric memories. But IBM scientists are convinced that optimal memory organization can bring access times into the tens of microseconds -- a thousand times faster than today's fixed-head disks and drums.

The availability of this kind of speed and capacity in an auxiliary memory could change the structure of computing systems radically. If auxiliary memory speeds begin to edge close to the "real time" operating speeds of central processors, the rationale for multi-programming -- and other schemes to keep the CPU busy while it's waiting -- disappears, for example.

Another interesting possibility is the advent of all-bubble computers. Since bubbles carry as well as store data, they could be processed directly by shunting them through bubble logic devices. Bubble processing elements could be fabricated directly onto a chip, side by side with memory loops. In fact large bubble chips will need built-in error detection logic. Chang, among others, pictures these devices evolving into monolithic computers with memory and local processors mixed throughout the system.

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Among the other technologies under development, holography, as was mentioned above, is resting on a back burner for the time being. It may yet find application as a way to store large amounts of read-only data, especially since holographic storage media may be kept on-line or off, like magnetic tape. But adapting holograms for interactive storage will be a long-range problem. Finding eraseable media may be the biggest roadblock -- RCA tried a thermoplastic film that could be erased with heat, but the cooling period before reuse was too long for effective use at computer memory speeds.

Charge-coupled memories show promise for a few rather narrow applications. In organization they resemble magnetic bubble chips, but the traveling bits are represented by electrical charges instead of magnetic fields. In the long run it's not likely that charge-coupled devices (CCDs) can compete with bubbles because CCD chip elements are larger and more complicated -- meaning higher costs and far lower bit densities.

A new kind of CRT

The electron beam-addressed memory (EBAM) is still quite experimental, but shows broader promise than either holography or CCDs. An EBAM consists of a semiconductor target covered with millions of simple capacitors. Data is written on the chip by a scanning electron beam (both target and beam are confined inside a cathode ray tube) that deposits charge on the capacitors. For readout, the beam detects these charges.

Developers of the Stanford Research Institute prototype say they can build target chips with densities of six million bits per square inch. The chips are positioned in the path of the CRT electron beam in enough quantity to yield from 10 to 100 million bits of storage per CRT -- and access times of "a few microseconds." Targets will retain data for several hours without power.

Denser and denser

What about MOS and bipolar semiconductors? Everyone agrees they're going to keep getting denser and cheaper very rapidly. With the introduction of 4K RAMS, chips have decidedly outstripped magnetic core in price -- and IBM is already hinting about 64K RAMs in the offing. If prices come down far and fast enough, MOS and bipolar memory could well find their ways into applications now allotted to auxiliary stores.

In any case, it isn't hard to see that integrated circuit technologies have little competition looming on the horizon. Almost all the proposed new memories are variations on the "more bits on cheaper chips" theme, a song that should warm the hearts of everyone in Silicon Valley. In fact, the present clear distinction between memory and processing hardware may become somewhat meaningless within, say, 10 years. By then, integration may have been carried to its ultimate conclusion.

Is the demise of the disk in sight? Not really. IBM, which giveth and which taketh away, will let the world know when the time has come to roll out the new bandwagon. Anyone else who tries to jump aboard early is likely to meet with a hostile reception from wary users as well as counterattacks from the Giant. Beyond that, existing computer systems have been designed to take maximum advantage of the prevailing memory hierarchy. The newer auxiliary stores will bring about a new order of things -- and probably will demand an entirely new generation of systems before they can come into their own.

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• UNIVAC APPARENTLY IS POISED to introduce a new small-end system in Series 90 at a press conference called for June 19. Last fall, when the first medium-scale members of Series 90 were unveiled, EDP/IR predicted that the next addition to the family would be an entry-level system designed to replace Univac's aging 9200s and 9300s. So, what else could Univac's market developers have in mind when they say the "means for thousands of users of small computing systems to achieve greater flexibility and growth potential at less cost will be introduced . . ."?

If this is what's coming, it will give Univac an entry in the line-up of new small systems that includes Honeywell's 62/20, NCR's 399, and (how long is "soon" descriptive?) a System/1 or System/2 from IBM.

Burroughs' answer for the small systems marketplace, announced last week, is a beefed-up collection of "business mini-computers." The new L 6000 series and "higher performance models" of the L 8000 series -- set for delivery from immediately to fourth quarter 1974 -- feature a new 30-character-per-second console printer, upward-compatible program products written in Cobol, one-to-four magnetic tape cassette stations, a computer-compatible magnetic tape unit, 96- or 80-column punched card equipment, and up to 64,000 bytes of integrated circuit memory in the L 8800 and 8900 models. They sell (only) for $17,000 to $29,000 plus peripherals, input/output subsystems, and memory options.

Most of the models can be converted "to powerful on-line terminal computers" says the company, which points out that larger systems are needed because "over 85,000 Burroughs mini-computers and associated terminal computers are in use or on order."

• COMMERCIAL BANKERS, WAKING UP to the accelerating pace with which electronic funds transfer systems (EFTS) are developing, are beginning to complain, cry foul, and talk about competition in a serious manner. Session after session at the ABA National Operations and Automation Conference late last month reflected the conference chairman's opening words: "We have seen the emerging tip of what may well be the largest iceberg of change ever to surface in our industry."

The code word for this change has become "Hinky Dinky" , . . name of the Nebraska supermarket chain that has teamed with a local savings and loan institution to offer in-store electronic withdrawals and deposits.

Now, there's a new attack from thrift institutions in Washington State. In a pilot project, 15 S&Ls have formed a joint venture called The Exchange Systems, Inc. and issued cards that work in a one-stop center outfitted with automated tellers, an automated Post Office, adding machines, and telephones. The system will handle cash or check deposits, cash withdrawals, mortgage payments, and cash checks for up to $100. If the off-line test works, The Exchange in six months or so will go on line and switch funds among the partipants.

What worries commercial bankers about projects such as these? They divert money that normally would be in checking accounts. In the Hinky Dinky experiment, results are 8-to-1 in favor of deposits vs. withdrawals. Legal questions are being raised, but pragmatic bankers recognize the inevitable . . . and finally seem deadly serious in pursuing EFTS efforts of their own.

• "OUR FIRST MODEL 11 INSTALLATION WENT IN LIKE A FRESH SPRING BREEZE," says Aetna Life & Casualty about the first (and Aetna's first of several) IBM double density 3330 drive that holds up to 200 megabytes per disk pack. The disk system is part of an on-line master file of 2.2 million auto and homeowner policies.

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"THE GRAY SHEET" JUNE 24,1974 • VOL.9,NO.18 P.J.McGOVERN,PUBLISHER

Univac announces one CPU for the $4K-to-$17K rental range -- page 3

IBM'S ANNOUNCEMENT OF 145 MEMORY EXPANSION SIGNALS HIGH 158 DEMAND -- SOME FS DELAYS? USER PURCHASES INCREASE

Four years ago this month (on June 30), IBM announced its first models of System/370 (non-virtual as they were) and proceeded to deliver the first 370/155 seven months later (early February of 1971). Deliveries of the 370/145, first machine with virtual storage capability (once it was announced), began three years ago in July. Why all the concern with history? Maybe it can tell us something, especially since IBM earlier this month doubled the main memory capacity of the 145.

The timing of the latest announcement was one week before Frank T. Cary, IBM chairman, in a Wall Street Journal interview, talked openly and almost uncharacteristically (for IBM) about how very good business continues to be. Coming as they did at a time when Honeywell also was telling Wall Street how "good" things are going -- and during what might be called the "mid-generation" doldrums only last week livened a bit by Univac's announcement of a broad-based, single-CPU attack on the small and medium scale market (page 3) -- the words from Armonk were subjected to perhaps more analysis than they deserve. Some fundamentals, however, seem to come through the message:

- Expansion of the 145 could imply that schedules for FS have slipped, and that customers are being taken care of.
- More likely, in the face of tremendous acceptance of the 370/158, IBM is attempting to smooth out its production curves and postpone some 145 upgrades by providing 145 users doubled capacity.
- Virtual storage may be great, but as IBM's press release says, "increased storage capacity may improve virtual storage processing efficiency by allowing users to keep more critical data ready for processing in main memory."
- With the IBM "blessing" on 2 megabytes of memory for the 145, independent memory suppliers -- facing a decline in add-on memory demand -- might find just the right stimulus for sales . . . especially since IBM noted a continuing "relatively high percentage of purchases."

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HISTORY OF IBM 370 INTRODUCTIONS AND EXPECTED SCHEDULE FOR FS
(Based on Actual Dates Plus "Telex" Evidence Except as Noted)

SYSTEM/370	Date Announced	Date First Installed	Typical Monthly Rental Range	FUTURE SYSTEM	Scheduled Announcement	Scheduled Installment	Typical Monthly Rental Range
				FS-1*	2Q/77	1Q/78	$ 3 - 6,000
370/115	3/73	4/74	$ 6 - 7,600				
				FS-2	2Q/76	2Q/77	$ 6 - 12,000
370/125	10/72	6/73	$ 9 - 11,000				
370/135	3/71	5/72	$ 12 - 16,000				
				FS-3	2Q/75	2Q/76	$13 - 26,000
370/145	9/70	7/71	$ 21 - 28,000				
370/155	6/70	2/71	$ 44 - 58,000				
370/158	8/72	4/73	$ 50 - 68,000				
370/165	6/70	6/71	$ 81 - 99,000	FS-4	1Q/76	1Q/77	$60 -120,000
370/168	8/72	7/73	$104 -127,000				

*FS-1 is an IDC assumption. All other FS information based on IBM "plan assumption" dated 10/71

Actually, elements of all these factors are likely behind the IBM executive's thinking -- and perhaps the company's announcement. It's almost a certainly that FS schedules have slipped beyond those prepared in late 197] (above) . . . probably a year or so. More will become clear if and when IBM announces its System "Q" (EDP/IR Jan.16,1974) operating system that was scheduled to precede new hardware.

The users' urge to own

And if Q and FS bring as many benefits as some pundits seem to think, IBM's timing will likely depend to a large degree on the continuation of the user trend to purchase. Earlier this year, in a study of 360/370 migration patterns, International Data Corporation, publisher of EDP Industry Report, found a couple of phenomena that factor heavily in what's happening:

- Many users switching to 370 at this mid-point in its product life want to purchase or lease from a third party. The demand was so great that IDC concluded purchases would be limited to some extent by the availability of capital.

- Another substantial group of users have decided to bypass 370 . . . making do with used 360s and independent add-on equipment until FS comes along.

This latter group together with the 370 rental base will be ready converts to FS. And the large purchase base will have "funded" an early FS announcement while supplying the base for later FS deliveries. At least that's a logical argument.

Meanwhile, the growing base of non-IBM-owned 370s will provide a market for independent main memory suppliers. But they will have a hard row to hoe. Shipments of independent core memory add-ons (primarily for 370/155s and 165s) peaked during 1973 and will be healthy only through 1974. From then on, the name of the game will be semiconductors . . . and manufacturing costs -- plus customer acceptance -- are a different matter. All in all, it seems to EDP/IR, there are some big questions in the IBM part of the marketplace.

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A rubber-band computer?

UNIVAC MAKES AN AGGRESSIVE MOVE IN THE LOW-END MARKET;
SINGLE NEW 90/30 CPU SPANS THE SMALL TO MIDDLE RANGES

Last fall, it was hard to take Univac too seriously when it introduced the first medium-scale model in its new Series 90 family -- and declared it was ready to win a "major share" of IBM's remaining 360/30 and 360/40 rental base. Speeches at the presentation had a nice ring . . . but they didn't sound like Univac.

But last week, Univac was back with another new entry in the commercial computer marketplace. And, for the first time, the Number Three mainframer's change of tune began to sound as if it might be more than whistling in the dark. The capabilities of the new 90/30 suggested that Univac has done some fresh thinking about small business-oriented computers -- and journalists jaded by recent lackluster announcements from Honeywell, NCR, and Control Data (caught up in the mid-generation doldrums?) were pleasantly surprised to find they had trooped into Manhattan for something more than a free lunch at The 21 Club.

In essence, the 90/30 offers small users a CPU with more power than the IBM 370/135 -- but with a minimum main memory of only 32K bytes and a compact disk-resident operating system -- for as little as $3,700 a month. It's as if Univac had wrapped up user needs in a system that stretches right along with them.

The flexible central processor, with its 600 nanosecond-per-two-byte cycle time, is obviously way overpowered for the smallest 90/30 configurations. It's almost like putting a V-8 engine in a Volkswagen. But this approach gives users the ability to expand the system all the way up to medium scale just by plugging in more memory, peripherals, and operating system modules. And at the high end, a 90/30 can have as much as:

- 262 kilobytes of semiconductor main storage.
- 1.6 billion bytes of on-line storage with 3330-type disks supplied by Univac's recently acquired ISS.
- 12 full-duplex communication lines.
- Broad operating system capabilities including communications, data base management, and transaction processing.

A "typical" large 90/30 with maximum main memory, 400 megabytes of disk storage, and a variety of tape drives, printers, and card devices will rent for just over $17,000 per month, or cost $535,000 outright purchase . . . which is apparently a Univac goal, with the low 31.5 purchase-to-rent ratio. Even the smallest configuration has a ratio of 38.

In between the largest and smallest configurations, Univac has outlined several "stages" of modular system expansion -- including an extended instruction set in micrologic and a wide range of peripheral power interfaced through adapters integrated into the central processor -- that let users upgrade through the equivalent of three traditional systems within a single "model" in the new series.

Thus, Univac has managed to cover the small to large range in its Series 90 family with only three basic systems -- the 90/30, the 90/60 medium-scale system

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introduced last October, and the larger 90/70 -- which is essentially a 9700 with semiconductor memory. Smaller, more specialized systems for new users are likely to come along within the year, perhaps along with another system in between the 90/30 and 90/60. A large-scale machine (the 90/80?) is reportedly in the works for commercial Series 90 users who don't want the conversion problems of jumping to the 1100 series. But Univac apparently isn't yet certain how to configure the machine for staying power in a market that's already in the "let's wait and see what IBM will be doing next" stage.

NEW operating system

The new operating system Univac developed for the 90/30 -- called OS/3 -- is "new" in much the same way the hardware is "new." Functions and basic components are familiar, but they fit together in modular fashion to allow flexible tailoring to the needs of many different users. As they are built up, OS/3's capabilities range from very basic to relatively elaborate.

Univac says it found in user surveys that small customers were most interested in simple-to-use information processing, "stability" of their systems, and efficient operating system supervision of computer resources. The basic OS/3 supervisor handles up to seven jobs concurrently, multi-tasking, automatic job initiation by job priority, spooling of data on tape and cards onto disks for speedier access, and other functions -- and it resides in only 16K bytes.

To help keep main storage at full capacity, OS/3 uses any empty spaces available for programs; at the same time, a hardware relocate feature automatically reshuffles blocks of data in main storage to create larger empty spaces of useable size. Nothing really new here, either . . . but it should impress a small user who wants lots of automatic functions in an operating system designed to run with a small main memory.

Modules for communication, data management

Add-on modules to the basic operating system include an information management system and a communications package. IMS/90 is a transaction-oriented data base management system for on-line inquiry/update by unskilled personnel. These packages, like the supervisory software, are modular and allow gradual expansion of peripheral handling, communications and data base capabilities.

In addition to the supervisory or resource management software, the 90/30 offering includes applications packages such as:

- A modular information system (UNIS) for bills of materials, inventory control, and production scheduling in manufacturing;
- A modular on-line financial institution package (PROFITS) that offers control and communications processing, time deposits, loan accounting, and information management;
- NEWSCOMP, a newspaper production system for processing news and classified ad copy on line;
- Also, a management control system (MCS), linear programming package, a hospital accounting package, wholesale inventory system, and machine tool programming package.

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Selling the 90/30

Univac's confidence in the 90/30 showed clearly at the press introduction, where the company underscored its new "bared fangs" approach to the market by displaying model-for-model price/performance comparisons of its system with IBM System/3s, 370/115s and 125s, Burroughs 1700s, and the new small HIS systems. And according to Univac's presentation, the 90/30 offers:

- Three times the CPU throughput of a System/3-10, five times the maximum main memory capacity and 30 times the disk capacity -- at about equal prices for similar configurations on a one-year lease. A five-year lease on the 90/30 makes it about 16% less expensive.

- Two-and-a-half times the CPU throughput of a System/3-15; twice the maximum main memory capacity and 18 times the disk capacity -- at a saving of 13% on a one-year lease or 20% on a five-year lease for similar configurations.

- Twice the CPU throughput of a 370/125, at the same price for a one-year lease and a 10% saving on a five-year lease.

- Bigger memory capacity and savings of 10% to 20% over the new Honeywell 62/60 and 64/20.

But easy growth paths and flexible system tailoring are the real selling points of the 90/30; and modularity of both hardware and software is the key to their accomplishment. Univac is well aware that savings of 10% or even 20% aren't enough by themselves to win over customers already "locked in" to other vendors. The company believes low-end users really want new applications, more power, and more convenience -- with cost savings taking a surprisingly low priority among user "druthers."

Dreams of Giant killing

With an estimated 25,000 installed computer systems within the 90/30's wide price range -- and 60% of them having been marketed for at least four years -- the potential market is very large. Univac feels it will be doing a brisk business if it can capture even a small fraction of its competitors' accounts in this range . . . but it talks openly of taking over as much as 20% of the low-end market with the 90/30. Users of small 360 systems will be among prime targets.

Accomplishing these ambitious marketing goals will demand a noticeable change in Univac's "image" among users -- a point the company seems to realize. Customer support and maintenance are being beefed up and the company seems to be placing stronger emphasis on applications support for commercial users. And since it aims to win over users of competitive systems, Univac sales efforts will be directed toward higher level management -- which Univac believes is more willing to initiate change than the average DP manager.

Following its new policy of waiting to announce new products until they are ready to be demonstrated and delivered, Univac actually displayed a 90/30 at the DPMA conference in Minneapolis this week . . . while IBM showed off its 370/115. Benchmark testing will be available to prospective customers by the end of the summer and volume deliveries of the system are slated to start in January. And then, Univac's big round in the IBM ring will begin.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF APRIL 1, 1974

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	B-200 Series	$ 5,600	11/61	100	73	173	X
	B-300 Series	$ 5,200	7/65	360	70	430	X
	B-500	$ 6,000	11/68	450	445	895	X
	B-705/711	$ 1,300	3/73	125	75	200	185
	B-1712	$ 1,950	8/72	153	57	210	100
	B-1714	$ 2,200	8/72	240	130	370	175
	B-1726	$ 5,300	2/73	145	25	170	110
	B-1728	$ 7,700	8/73	35	15	50	70
	B-2500	$ 8,200	2/67	257	140	397	X
	B-2700	$ 8,700	8/72	112	78	190	90
	B-3500	$ 14,700	5/67	630	355	985	X
	B-3700	$ 20,000	11/72	47	10	57	32
	B-45/4700	$ 27,000	10/71	123	90	213	65
	B-5500	$ 35,000	3/63	78	29	107	X
	B-5700	$ 29,500	12/70	20	5	25	6
	B-65/6700	$ 50,000	11/69	64	53	117	15
	B-7700	$120,000	8/73	5	2	7	13
	Subtotals			2,944	1,652	4,596	861
CDC	G-20	$ 19,600	4/61	3	5	8	X
	1604/A/B	$ 42,000	1/60	17	4	21	X
	31/3150	$ 9,000	12/64	86	48	134	X
	3170	$ 17,500	12/70	14	8	22	X
	3200	$ 14,700	5/64	48	44	92	X
	3300	$ 28,800	9/65	117	90	207	X
	3400	$ 23,700	11/64	4	8	12	X
	3500	$ 26,000	1/69	10	17	27	X
	3600	$ 48,000	6/63	18	15	33	X
	3800	$ 53,000	12/65	19	3	22	X
	6200	$ 42,600	11/70	2	6	8	X
	Cyber-72	$ 48,400	10/71	20	33	53	9
	Cyber-172	$ 41,200	1/75	-	-	-	NA
	6400	$ 59,600	5/66	56	49	105	X
	Cyber-73	$ 42,100	3/72	10	26	36	3
	Cyber-173	$ 54,600	1/75	-	-	-	NA
	6500	$ 78,800	12/67	20	12	32	X
	6600	$105,300	8/64	58	31	89	X
	Cyber-74	$ 93,000	3/72	3	6	9	3
	Cyber-174	$ 67,500	1/75	-	-	-	NA
	Cyber-175	$ 84,000	1/75	-	-	-	NA
	6700	$107,000	7/70	3	0	3	X
	7600	$125,000	1/69	9	6	15	X
	Cyber-76	$125,000	3/72	2	3	5	1
	Star-100	$250,000	12/73	1	0	1	3
	Subtotals			520	414	934	19
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	16	8	24	X
	1040/1050	$ 13,300	10/67	180	74	254	13
	1055	$ 22,000	12/71	27	9	36	12
	1070/1077	$ 30,000	6/72	13	2	15	6
	Subtotals			236	93	329	31
HIS	Gamma 10	$ 2,500	7/64	0	995	995	X
	Gamma 30	$ 9,900	2/62	0	150	150	X
	G-5X Series	$ 1,550	1/66	640	2,990	3,630	100
	G-100 Series	$ 4,000	4/66	279	1,535	1,814	X
	G-200 Series	$ 13,700	4/61	193	52	245	X
	G-405/410	$ 9,000	2/68	18	8	26	X
	G-415/420	$ 14,000	5/64	134	188	322	X
	G-425/430	$ 17,000	6/64	42	101	143	X
	G-435/440	$ 22,000	9/65	95	48	143	X
	G-615	$ 55,000	6/69	4	22	26	X
	G-625	$ 65,000	4/65	2	3	5	X
	G-635	$ 80,000	5/65	46	18	64	X
	G-645	$120,000	7/66	2	1	3	X
	G-6025	$ 21,800	11/73	30	7	37	51
	G-6030/40	$ 33,000	6/71	91	102	193	45
	G-6050/60	$ 46,500	7/71	82	30	112	31
	G-6070/80	$ 61,500	7/71	44	15	59	16
	G-6180	$100,000	2/74	1	0	1	4
	G-Subtotals			1,703	6,265	7,968	247
	H-105	$ 2,500	11/71	525	125	650	130
	H-110	$ 2,600	9/68	153	168	321	X
	H-115	$ 5,300	3/70	1,150	385	1,535	190
	H-120	$ 4,600	1/66	412	173	585	X
	H-125	$ 7,900	12/67	84	322	406	X
	H-200	$ 6,400	3/64	470	247	717	X
	H-2020	$ 2,350	2/73	270	33	303	130
	H-2030	$ 5,050	1/73	48	7	55	24
	H-2040	$ 9,000	4/72	264	88	352	88
	H-1015	$ 12,500	4/71	104	56	160	26
	H-2050	$ 14,100	4/72	155	44	199	50
	H-12/1250	$ 12,000	2/66	309	158	467	X
	H-2015	$ 17,800	2/71	108	51	159	25
	H-2060	$ 18,500	4/72	68	10	78	19
	H-2200	$ 19,600	1/66	119	47	166	X
	H-2070	$ 23,000	5/72	45	6	51	14
	H-3200	$ 26,900	2/70	64	29	93	X
	H-4200	$ 31,000	9/68	28	5	33	X
	H-2088	$ 44,000	4/72	4	1	5	2
	H-8200	$ 73,000	2/69	22	4	26	X
	H-4/1400	$ 13,200	12/61	27	25	52	X
	H-800	$ 28,500	12/60	34	11	45	X
	H-1800	$ 46,000	7/64	7	4	11	X
	H-Subtotals			4,470	1,999	6,469	698
	HIS-Totals			6,173	8,264	14,437	945

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IBM	System 3/6	$ 1,700	12/70	2,845	1,535	4,380	675
	System 3/10	$ 2,450	1/70	14,140	6,655	20,795	2,450
	System 3/15	$ 4,550	3/74	25	0	25	1,500
	360/20	$ 3,600	12/65	3,045	4,605	7,650	X
	360/22	$ 5,800	7/71	965	285	1,250	X
	370/115	$ 6,650	4/74	-	-	-	1,800
	360/25	$ 7,500	10/68	630	1,015	1,645	X
	370/125	$ 9,800	6/73	1,115	625	1,740	1,160
	360/30	$ 11,000	6/65	2,975	2,400	5,375	X
	370/135	$ 16,225	5/72	2,300	1,105	3,405	920
	360/44	$ 14,200	7/66	66	80	146	X
	360/40	$ 19,400	6/65	1,455	1,720	3,175	X
	370/145	$ 27,800	7/71	1,760	865	2,625	490
	360/50	$ 32,100	8/65	640	550	1,190	X
	370/155	$ 53,350	2/71	1,090	490	1,580	X
	370/158	$ 59,200	5/73	235	150	385	460
	360/65	$ 68,000	11/65	470	222	692	X
	370/165	$ 95,000	6/71	195	61	256	X
	370/168	$110,200	7/73	87	23	110	165
	360/67	$112,000	6/66	37	14	51	X
	360/75	$ 94,000	1/66	32	16	48	X
	360/85	$141,000	10/69	4	4	8	X
	360/9X	$150,000	11/67	14	2	16	X
	370/195	$194,600	3/71	20	4	24	7
	1130	$ 2,300	2/66	2,675	1,880	4,555	X
	1401	$ 3,700	9/60	1,080	830	1,910	X
	1401-G	$ 2,300	5/64	88	39	127	X
	1401-H	$ 1,300	6/67	52	43	95	X
	1410	$ 17,000	11/61	95	53	148	X
	1440	$ 4,700	4/63	238	242	480	X
	1460	$ 9,800	10/63	54	39	93	X
	1620	$ 2,700	9/60	319	228	547	X
	7010	$ 26,000	10/63	13	7	20	X
	7030	$160,000	5/61	3	1	4	X
	704	$ 32,000	12/55	1	1	2	X
	7040	$ 25,000	6/63	9	15	24	X
	7044	$ 36,500	6/63	8	10	18	X
	705	$ 38,000	1/56	3	3	6	X
	7070-74	$ 27,000	3/60	100	36	136	X
	7080	$ 60,000	8/61	47	1	48	X
	7090/94	$ 70,500	8/60	71	11	82	X
	Subtotals			39,001	25,865	64,866	9,627
NCR	Century-50	$ 1,650	2/71	1,000	60	1,060	170
	Century-100	$ 2,980	9/68	1,170	800	1,970	X
	Century-101	$ 2,750	10/72	375	40	415	140
	Century-151	$ 3,500	2/75	-	-	-	NA
	Century-200	$ 7,900	9/69	700	390	1,090	80
	Century-201	$ 7,000	8/74	-	-	-	NA
	Century-251	$ 10,000	11/73	45	30	75	100
	Century-300	$ 20,000	2/72	29	20	49	17
	304	$ 10,000	1/60	6	0	6	X
	310	$ 1,000	5/61	14	9	23	X
	315	$ 5,000	5/62	320	260	580	X
	315-RMC	$ 11,800	9/65	54	44	98	X
	390	$ 800	5/61	250	160	410	X
	500	$ 1,100	10/65	750	1,535	2,285	X
	Subtotals			4,713	3,348	8,061	507
Philco	1000	$ 7,000	6/63	15	1	16	X
	210/211	$ 40,000	10/58	10	1	11	X
	212	$ 52,000	1/63	8	1	9	X
Singer	System 10	$ 2,500	10/70	945	680	1,625	450
Standard Computer Corp.	IC-4000	$ 9,000	9/68	4	0	4	X
	IC-6000	$ 16,000	5/67	3	0	3	X
	IC-7000	$ 17,000	6/69	7	0	7	X
Univac	I/II	$ 25,000	3/51	3	2	5	X
	III	$ 25,400	8/62	34	37	71	X
	SS-80/90	$ 8,000	8/58	19	21	40	X
	418-I/II	$ 13,700	6/63	73	77	150	X
	418-III	$ 19,600	7/69	43	53	96	6
	491/492	$ 27,000	12/61	17	12	29	X
	494	$ 41,400	2/66	52	41	93	X
	1004	$ 1,000	2/63	895	925	1,820	X
	1005	$ 1,630	4/66	700	200	900	X
	1050	$ 8,800	9/63	178	140	318	X
	1103/5	$ 35,000	12/50	0	3	3	X
	1106	$ 40,000	12/69	73	97	170	30
	1107	$ 57,000	10/62	7	13	20	X
	1108	$ 68,000	9/65	135	97	232	X
	1110	$ 79,000	6/72	13	25	38	21
	9200	$ 2,300	6/67	1,550	935	2,485	X
	9300	$ 4,050	9/67	895	880	1,775	X
	9400	$ 11,600	5/69	263	297	560	55
	9700	$ 21,600	8/72	11	17	28	X
	90/60	$ 16,200	1/74	6	0	6	NA
	90/70	$ 22,000	11/73	5	0	5	NA
	Subtotals			4,972	3,872	8,844	112 +
	301	$ 6,600	10/60	161	8	169	X
	501	$ 16,100	6/59	14	0	14	X
	3301	$ 22,700	7/64	64	0	64	X
	Spectra 70/15	$ 4,000	9/65	13	0	13	X
	Spectra 70/25	$ 7,000	9/65	2	2	4	X
	Spectra 70/35	$ 11,800	1/67	95	5	100	X
	Spectra 70/45	$ 22,600	11/65	261	18	279	X
	Spectra 70/46	$ 37,400	11/68	33	2	35	X
	Spectra 70/55	$ 34,900	11/68	6	2	8	X
	Spectra 70/60	$ 40,500	9/70	18	0	18	X
	Spectra 70/61	$ 47,200	3/71	10	0	10	X
	Spectra 1600	$ 3,600	1/69	67	0	67	X
	Spectra 70/2	$ 11,500	7/71	113	0	113	X
	Spectra 70/3	$ 18,900	10/71	19	0	19	X
	Spectra 70/6	$ 29,300	10/71	45	0	45	X
	Spectra 70/7	$ 36,300	10/71	22	0	22	X
	Subtotals			943	37	980	0
	Totals			5,915	3,909	9,824	112 +
Xerox	Sigma-5	$ 11,500	8/67	265	60	325	X
	Sigma-6	$ 20,000	11/70	36	8	44	7
	Sigma-7	$ 24,000	12/66	100	25	125	X
	Sigma-8	$ 19,000	9/71	19	6	25	5
	Sigma-9	$ 44,000	11/71	35	8	43	9
	530	$ 3,500	8/73	95	10	105	80
	550	$ 7,525	11/74	-	-	-	NA
	560	$ 17,030	11/74	-	-	-	NA
	940	$ 24,000	4/66	59	5	64	X
	9300	$ 8,500	11/64	30	5	35	X
	Subtotals			639	127	766	101 +
TOTALS				61,133	44,355	105,488	12,653 +

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• THE "KNEE-JERK" REACTION OF THE PUBLIC in favor of free enterprise is one of Ma Bell's biggest bugaboos these days -- or at least that's what one would gather from the contents of an internal report written by a Bell System research team recently. Excerpts from the report found their way into the columns of the New York Times last week . . . and indicate that AT&T is pondering ways to change the public's inbred suspicion of private monopoly power. Obviously Bell sees this prejudice as the major roadblock in its efforts to stop the growth of the competing specialized common carriers and the interconnect industry.

Both these competitive forces came into existence when the FCC decided that AT&T's regulated monopoly was retarding progress in data communications and other special sectors of the communications market. And the new competitors -- such as MCI, Datran and the interconnect equipment vendors -- threaten to be so successful that Bell has mounted a major counterattack. But Bell's efforts to have the FCC rulings overturned have been thwarted, the Giant believes, by the public's "deeply held beliefs about the American way of life, namely, the inherent benefits of competition or free enterprise," the report was quoted as saying.

The report recommended that AT&T "exploit every avenue of communication available" to get across its arguments in favor of monopoly power in the communications industry. And recent events may have intensified Ma Bell's beleaguered feeling -- Congress is considering a bill that would outlaw monopoly in several industries where it has been traditionally allowed, and the Antitrust Division of the Department of Justice has begun to turn its attentions toward AT&T. Meanwhile, Bell is making progress in its counterattacks on the marketing front. The FCC last week approved Bell's proposal for restructured private line rates -- offering bargain prices for customers using its lucrative high-traffic routes.

• NO DOUBT IT WAS A COINCIDENCE, but the other industry giant under antitrust attack showed a conspicuous lack of sympathy for its fellow-sufferer last week when it announced a new high-speed modem to connect data communications equipment to Bell's voice-grade lines. IBM's 3874 modem transmits at up to 4,800 bits per second over dial-up or dedicated lines. In addition to its modulating-demodulating capability, the modem comes with such options as automatic answering and call-up features and can be configured to handle transmissions among multiple terminals and sites over dedicated lines.

• TIGHTER COORDINATION OF HONEYWELL'S TWO MAJOR business activities -- control systems and information systems -- was the reason announced for transfer of Honeywell Information Systems' top management from Metropolitan Boston to Honeywell world headquarters in Minneapolis. HIS Executive Vice President Clancy Spangle will join President Stephen Keating and the top officer of the Control Systems division in the "Office of the Chief Executive," a new arrangement designed to "insure maximum broad corporate input to all operating and policy decisions." The move reportedly affects only a few dozen personnel and "will have no material effect on Honeywell's Massachusetts operations," according to a spokesman.

• MEANWHILE, HIS SAID IT IS "VERY ENCOURAGED" by the response to its new Series 60 computer family. April bookings were up 14% over 1973, according to company officers. The very existence of the new series has caused the "strong resurgence of orders for established Honeywell systems" because users are convinced they'll have adequate upgrade opportunities for the indefinite future within Series 60. In his annual meeting with stockholders last month, President Stephen Keating repeated his assertions that general shortages can help the computer business.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 8,1974 • VOL.9,NO.19 P.J.McGOVERN,PUBLISHER

IBM FINALLY HEADS FOR OUTER SPACE: BUYS INTO SATELLITE COMPANY AND SIMULTANEOUSLY ENTERS SPECIALIZED COMMON CARRIER MARKET

Defying the laws of gravity and ignoring the nervous nellies who worry about the implications of allying the computer and communications industries ("monopolies"?), Giant IBM has announced it will push its head way above the clouds sometime in the "late 1970s" by launching a domestic communications satellite.

When news of this came out about noon on the day before the long Fourth of July weekend, it had the sound of something bigger than a mere pre-holiday firecracker. Officially, IBM had done nothing more than buy a majority interest in a joint domestic satellite venture (named CML) originally formed by COMSAT, MCI Communications Corp., and Lockheed. IBM pays the group $3.2 million -- a couple of hours worth of its revenues -- in return for a 55% partnership in the company. MCI and Lockheed take their shares of the money and bow out, leaving COMSAT as sole minority partner in the venture.

So it wasn't a "major" acquisition for IBM. (Unless any such move by IBM, not an acquisition-prone company, is considered "major.") But the potential implications of IBM's entry into the communications market -- and the prospect of IBM's becoming one of the specialized common carriers that Ma Bell wrings her hands over -- somehow gave the announcement an aura of drama and portent.

According to a joint statement by the chief executives of the two companies, the partnership can make "substantial contributions" to communications by "joining our technical capabilities and experience." An IBM spokesman said IBM intends to offer specialized transmission services to both government and commercial users -- primarily for "voice, imaging, and data services using digital techniques." On the day of the sale, the new partners told the Federal Communications Commission:

- CML, which will be renamed soon, will be owned by wholly owned subsidiaries of IBM and COMSAT. The board of directors will consist of six IBM appointees plus five from COMSAT.
- The company will offer transmission services as a specialized common carrier -- if the FCC approves.
- If the service proves successful after the first satellite is launched, ownership will be broadened by a "substantial" offering of shares to other investors of the public.

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What's processing? ? ? What's transmission?

IBM's complex relationship to the satellite company suggests a conscious effort from Armonk to fulfill the spirit of the FCC's "arm's length rule" that says common carrier companies (those subject to FCC jurisdiction) must be kept legally separate from companies in non-regulated businesses. This rule was reinforced by the decision of the "great computer inquiry" during the late 1960s.

But the FCC's effort to distinguish between information transmission and information processing has been under constant question since the day it was made. Experts are increasingly uncertain about where the line should be drawn . . . the dilemma grows as such "hybrid" services as packet switching, stock quotation networks, and "computer utilities" proliferate. In the present case, nothing specific has been announced about the nature of the "specialized" services, but . . .

"Imaging," for instance, covers television transmission and presumably facsimile. IBM has done quite a bit of work in the field of image digitizing and image processing by digital computers. Some of these techniques can greatly reduce the number of bits required to transmit images. If this service were offered to television networks, for example, as a low-cost transmission service, would the data processing fall under FCC jurisdiction? It probably would be considered "incidental" in that example. But there are others.

Anyone can play, can't he?

Looming above the sticky regulatory issues is the spectre of IBM -- already called "monopolist" by one federal judge. Will it extend its immense power into communications? Implications aren't clear, but the 1971 FCC decision ending AT&T's interstate transmission franchise means "anyone can play," as one IBMer puts it.

Currently, Ma Bell's Long Lines subsidiary plans to lease domestic satellite channels from COMSAT, as does GT&E; AT&T won't be operating its own domestic satellites for another two years. Meanwhile, a spate of other companies have announced plans to put into orbit large-capacity communications satellites for U.S. users -- Western Union launched the first of these in April and a second is set for a summer shot; RCA has similar plans. Thus, even before the first domestic satellite channels have become available, an "oversaturation" problem is looming. Despite transmission savings of over 50% on coast-to-coast dedicated lines -- which should stimulate the market considerably -- it may be several years before the market is big enough to absorb all that capacity.

That situation won't last; and the long-range outlook for truly "specialized" satellite communications services is bright. Obviously, IBM is convinced that -- with the help of its own advanced data processing technologies -- it can push CML into a strong position in the burgeoning market. One indication of this potential could be IBM's announced intention to open the new company to outside investors, a move seemingly designed to quiet protests from any critics worried about possible encroachments of a new monopoly power in communications. Some of the critics, of course, will welcome a potential AT&T vs. IBM showdown.

At present, CML consists of about 50 people in the Washington, D.C. area hard at work on development plans and costing the parent companies about $200,000 per month. Now that IBM -- with its vast resources -- is at the helm, plans may change direction a bit. IBM and COMSAT say they'll file a more detailed action plan with the FCC next month. A new computer/communications force just might be brewing.

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Many dilemmas unresolved, DPMAers hear

MAINFRAMERS (MINUS IBM) TALK ABOUT THE FUTURE OF COMPUTING

After listening to two days of talks and panels on such nitty gritty topics as how to implement virtual storage, use minicomputers, and play politics with and for top management, members of the Data Processing Managers Association -- convening in Minneapolis late last month -- relaxed for a final afternoon session on the "future of computers."

DPMA had decided it would be best to get forecasts from the horses' mouths -- so each of the mainframers was invited to send a speaker. And all had agreed to participate. But at the last minute IBM failed to show -- depriving the conventioneers of their chance to hear from the company that will have the most to say about the future of computers. On the other hand, the Giant's conspicuous absence left more room in the spotlight for the other mainframers to air their views and "party lines." Some of the highlights:

• Donald Bonstrom of Control Data (giving his "personal" views, though he "occasionally agrees with top management") said he foresees the continuing decentralization of memory and intelligence for the next ten years. On the systems level, decentralization offers designers an easy way out of many design problems inherent in monolithic systems, in which a single powerful processor has to keep track of all the housekeeping chores as well as work on problems. And the efforts of semiconductor manufacturers to cut the human labor needed to build an increasing number of computer components will make hardware continually cheaper -- thus making logic and memory easier to spread around.

At the network level, cheap memory will help solve the buffering problems involved in interconnecting many terminals, front-end processors, and mainframes. And specialized microprocessors in terminals and clustered around CPUs will make wider "byte distribution" feasible, Bonstrom said.

Does all this mean the end to the big CPU? No! (Remember, this speaker works for the "builder of the world's most powerful computers.") Freed from swarms of minor tasks, large central processors will begin to approach their real capacities as workhorses, Bonstrom thinks. They'll offer the cheapest data processing ever as they hum along at the heart of data (and perhaps service) networks.

The problems in this change of approach aren't technical, Bonstrom says, but have to do with "maturity and maternalism." The natural conservatism of a maturing industry means reluctance to change . . . as Mother IBM probably resists decentralization because it increases the threat from competitive "plug-in" devices.

• Honeywell Vice President Lee Sheehan startled his audience of data processing managers by telling them they may have to move up in their companies if they don't want to be moved out along with their computers. Sheehan quoted the views of users who believe in-house computer systems will give way to computer utilities offering batch, interactive, and transaction processing. But then he retreated to higher (safer?) ground . . . claiming this scenario doesn't really fit HIS plans.

In Honeywell's view, computer systems will be increasingly used within time-sharing networks on a "utility" basis -- but most often as in-house utilities for many users within a single large organization. HIS plans to "establish a dominant position in the utility and networking markets," Sheehan said.

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• Small business computers were the topic of the day for Paul Bunton, the Burroughs representative. Bunton pointed out that 99% of all U.S. companies at present use no computer equipment at all -- and entry-level systems for these firms represent the fastest growing segment of the data processing marketplace.

To reach these users successfully, Bunton said, small business systems will have to be sold on a solutions basis rather than as collections of hardware and software. Increasing power will help small systems become more self-regulating, easier to use, and easier to upgrade. Better applications software and interchangeable language and data structures will complete the process of making small machines as "comfortable as an old pair of slippers" for non-specialists to use.

The same systems with different microprogramming will become computer terminals, front-end processors, and satellite computers within networks, according to Bunton. He pointed to Burroughs' own L Series of "business mini-computers" and the corresponding TC terminal computers as examples. Similar on-line/stand-alone "twins" will provide interfaces between non-specialist users scattered throughout large organizations and the host processors in home offices.

• Richard Gehring of Univac outlined the five generations of computer development (as he interprets them) for the DPMA audience:

First	1951	Computation, business and scientific
Second	1958	Data processing
Third	1963	Information processing
Fourth	1970	On-line information processing
Fifth	1976-78	Man's intelligent assistant [the era of information appliances? -ed.]

And he gave a report of what to expect within the next ten years if Univac futurists are correct. Improvements during the next decade will mean: 1,000 times as many functions per component; 10-to-100 times more throughput; 1,000 times more reliability; 100 times more on-line storage; 1,000 times less material per component; and 100 times less cost per processing function.

• DEC spokesman Irwin Jacobs laid it on the line about minicomputers ("just like any other computer . . . except you don't get any vendor support!") And he was only half kidding, his comments disclosed. DEC plans to concentrate on high-volume manufacturing and stay away from applications support and providing custom software. Reason: Applications cost too much now . . . and soon will cost more than basic minisystem hardware and control software. Minicomputers are becoming off-the-shelf commodities that unsophisticated users can't handle easily.

For the long run, DEC plans to join with third-partner systems houses that can turn out end-user systems based on DEC minis. Eventually this combined effort could lead to small business systems renting for as little as $25-to-$50 a month, Jacobs predicted. And to sell bare hardware, the company may well turn to franchised "computer stores" where customers could buy miniprocessors and peripherals the way hi-fi nuts buy amplifiers and loudspeakers today. "It's hard to sell a cheap item with expensive salesmen," he pointed out.

• Point-of-sale and other autotransaction systems naturally were the focus of the NCR representative's talk. And even in this pragmatic sector of the "new" computer industry, smart vs. dumb terminals, for example, is a key point of discussion. EDP/IR will report on this burgeoning sector in an upcoming issue.

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HONEYWELL LOOK-ALIKES INTRODUCED FOR JAPANESE COMPUTER MARKETPLACE

In Japan -- where head-on competition with IBM is a serious, subsidized business -- a new line of computers, based on Honeywell's recently announced Series 60 family, was introduced last month by the Nippon Electric/Toshiba combine. And the Japanese -- long known as astute "borrowers" of American technology -- picked up strong on the HIS approach to Giant-killing . . . uniting a family under a full-range, modular operating system.

Closely timed with the NEC/Toshiba announcement was word of another new Japanese computer family, this one from the Mitsubishi/Oki group. It introduced a system in the 370/145 range, called it COSMO, and revealed that two smaller models and a larger member of the family will be ready by the end of next year.

NEC/Toshiba calls its new family ACOS Series 77 . . . and "ACOS," significantly, is the name of the operating system. According to NEC spokesmen, ACOS stands for "Advanced COmputer System with Advanced Operating System." But Toshiba experts are more frank -- they say it simply means Advanced GCOS, Honeywell's General Computer Operating System adapted from early GE efforts for Series 60.

In developing the ACOS Series 77, Nippon and Toshiba have followed the evolution of Series 60 in almost mirror-image fashion. Nippon has been licensed to use Honeywell technology since 1960, and Toshiba had a similar arrangement with General Electric, which Honeywell bought out in 1970. Since then, HIS has been working in the U.S. and Europe to combine lower-end computers into a common family with the larger offshoots of the GE line. The Nippon/Toshiba group effort, it seems, has had the same objective. Thus it isn't surprising that the end-result of the Japanese project looks "a lot" like the HIS Series 60. For example:

- Microprogramming is used extensively to handle basic operating system functions such as communications, channel scheduling, stack control . . . features that support multiprogramming and on-line data base management software. "Failsoft" monitors keep systems running even when individual parts fail.

- Just as all Series 60 CPUs function under upward-compatible subsets of GCOS, the Series 77 systems all use modular subsets of ACOS. But the Japanese systems aren't directly compatible with those from HIS.

- "Compatibility modes" allow users of NEC's smaller H-200 type computers to move to the new family by running old programs under ACOS; and users of Toshiba's Tosbac (Series 6000 type) computers get conversion aids.

- Japanese users appear to be big virtual storage fans -- new systems that lack VS just aren't "with it" according to reports -- so NEC/Toshiba stresses that the Series 60 type automatic program segmentation and swapping techniques are incorporated into Series 77.

- Hardware, as would be expected, is right up-to-date, with LSI circuitry and MOS memory used throughout Series 77.

Since the Japanese government has responded to strong U.S. pressure to "liberalize" computer import restrictions next year, the Japanese manufacturers are scrambling to the barricades. Under restrictions, IBM-Japan's share of the local computer market has been held to a "mere" 27% -- IBM's smallest share in any non-

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COMPARISON OF ACOS SPECIFICATIONS WITH SIMILAR HIS SERIES 60 SYSTEMS

Central Processor	62/60	ACOS System 200	64/20	ACOS System 300	ACOS System 400
Main Storage Capacity (KB)	64-128	48-104	64-131	96-256	128-384
Main Storage Cycle Time (ms)	1.0	1.0	1.0	1.0	1.0
Bytes Fetched/Cycle	2	2	4	4	4
Storage Type	MOS	MOS	MOS	MOS	MOS
Control Memory Access Time	170 ns.	170 ns.	175 ns.	175 ns.	175 ns.
I/O Channels	6	6	3	5	6
Maximum I/O Rate (KB/sec.)	837	900	1250	4000	4000
Console Printer	30 cps	30 cps*	30 cps	30 cps*	30 cps*
Mass Storage					
Capacity/Drive (MB)	29	5.6/11.2/29	29/100	29/58/100/200	29/58/100/200
Drives/Controller	2-4	4-8	8	8	8
Printers					
Speed (Maximum lpm)	600	700	1600	1400	1400
Type	Drum	Drum	Belt	Drum	Drum
Print Positions	120	111	136	132	132
Card Equipment					
Speed (cpm)	600	800	1050	1050	1050
Columns	80	80	80	80	80
Operating System	GCOS-2	ACOS-2	GCOS-4	ACOS-4	ACOS-4

* Capable of handling kana (Japanese phonetic alphabet)

communist country -- while the rest of the pie has been divided among seven other Japanese-based companies (most with a U.S. partner). Soon, however, the Japanese must prepare to meet the full brunt of other U.S. mainframers as well; that means they soon must have full lines of competitive equipment.

Three out of eight -- for delivery this winter

The low-end systems in NEC/Toshiba's family -- designed to compete with IBM's System 3/15 and its 370s up through the 135 -- will be ready for delivery as 1974 comes to a close:

- System 200, smallest in the ACOS family, sports a rental range of $4,700-to-$12,000 per month and is claimed to be competitive with the 3/15 and the 370/115. The 200 features dynamic memory allocation, integrated communications controllers, and can have up to 104K bytes of main memory. Cycle time is one microsecond per two bytes.

- System 300, the equivalent of the new HIS 64/20, lets small NEC and Toshiba users "step up" to large-scale ACOS. It runs old programs in "compatibility mode" while users convert software to ACOS. And with a $9,000-to-$20,000 rental, it competes with IBM's 370/125.

- System 400, a medium-scale version of the 300, is designed to fight the 370/135. It's available with up to 384K bytes of main memory,

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and rents for $12,000-to-$25,000 a month. (This model fits the "gap" in Honeywell's Series 60 -- see EDP/IR Apr.30,1974).

Eventually, the ACOS Series 77 will be expanded to eight levels of processing power. Systems 500 through 900 are still under development and announcement dates haven't been set -- but no doubt they'll be closely related to Level 66 in the HIS Series 60. What's more important, NEC/Toshiba has followed Honeywell's lead with what is quickly becoming a computer industry trend -- emphasizing the operating system/communications/data base management aspects of the family (brochure covers featured software), pushing hardware somewhat aside from center stage.

A "dead copy?"

Some Japanese critics greeted the Series 77 announcement as a pointless exercise in "carbon copying" U.S. products. But NEC/Toshiba sopkesmen say there are some basic differences -- that ACOS and Series 60 machines aren't compatible at the hardware level. More to the point, they stress features designed especially to suit the Japanese market. To wit:

- Automatic message processors added to the systems save start-up time with on-line systems. NEC/Toshiba claims this will bring direct cost advantages to the manufacturer because, in Japan, computer builders have to bear costs of on-line implementation for their customers.

- NEC/Toshiba says most peripherals are based on its own technology. The 200 megabyte disk subsystems for Systems 300 and 400, for instance, offer twice the capacity of the HIS equivalents.

- NEC/Toshiba offers its own array of printers and display units for use with "kanji," Japan's phonetic alphabet, as well as the advanced paper tape and card units widely used in Japan.

The pitfalls of marriage

NEC/Toshiba is one of three major Japanese industrial combines developing IBM-competitive computer lines under subsidy from the Ministry of International Trade and Technology. And as first to announce a "one-family" line, it may have a marketing edge. But the COSMO 700 introduced by Mitsubishi/Oki will be available by the end of this year, with other models eventually covering the spectrum.

Meanwhile, many observers place their bets on the huge Fujitsu/Hitachi combine. This pairing of Japan's largest computer builders is expected to unveil a new large-scale family this fall . . . and it's bound to be impressive, even if it results in the rumored marketing conflicts between the two partners.

The Fujitsu/Hitachi family will consist of four machines, ranging from the 370/145 sized M-1 to the giant M-4, which Fujitsu claims will be three times as powerful as the 370/168. (This could be the Model X developed jointly with Amdahl Corp. Reports are that production of X will start soon, and that a total annual production of about 30 systems is expected.) The two Japanese companies reportedly are at odds over which models should be announced first: The smallest machine would impact sales of a Fujitsu computer for which deliveries have just started; Hitachi wants to announce the large one in hopes of penetrating an older segment of the Fujitsu base. Sounds to EDP/IR like a classic illustration of the joint-development pitfalls . . . that could crop up between CDC and NCR?

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• HONEYWELL IS BUSY RAISING ITS PROFILE in the minicomputer market these days, beginning a major effort to tie down a full share of the networking and communications markets. HIS announced dramatic price cuts in its System 700 "Minisystems," ranging up to 30% on the 716 central processor and up to 45% for 8K memory units. The computers are designed for use as communications processors or sensor-based processors and now come in both bundled and unbundled versions.

Coincident with the price "restructuring," Honeywell said it is setting up nine "Mini-net Data Centers" around the country for System 700 demonstrations and customer support, including software development and training. Among the versions offered are a remote network processor for remote batch jobs and message concentration; a remote job entry system for System 360/370 hosts, and a sensor-based system for process control.

Honeywell spokesmen indicated these first efforts are just the start of a drive to match the communications offerings bound to be available from other manufacturers in the near future. Basically designed to support Series 6000 and the new Series 60 mainframes in network environments, Honeywell's minisystems will be expanded steadily with new peripheral offerings and other capabilities. And while present HIS minisystems are designed to protect the HIS user base, future installments are likely to emphasize support for competitors' mainframes.

• THERE'S BIG BUSINESS IN BETTING, CONTROL DATA WAGERS. CDC has received an order for a vast on-line betting system from the Victoria Totalizator Board in Australia -- and plans to sell similar systems to other governments that run sports pools and lotteries. Not a "supercomputer" network, as one might expect, the CDC scheme uses a network of System 17 minis to handle more than 1,500 betting windows. CDC has already installed wagering networks in locations as far apart as New Zealand, Thailand and upstate New York.

Last week also brought word of a big auto-transaction contract for NCR, which landed an order worth an estimated $12 million from Publix Super Markets, a Florida-based food chain. Publix will equip half its 180 stores with laser-scanning checkout terminals and computers -- giving NCR its biggest supermarket order to date.

• MOHAWK DATA SYSTEMS HAS UNDERGONE a "realignment of major management responsibilities" after sustaining a net loss of $15 million in FY'74. V.E. Johnson, a founder and former president of the company -- at present chairman of the board -- will again become president with a "mandate to realign the company in the unsettled condition of today's business environment." Mohawk's revenues were $168 million this year, up 20% from the year before.

• TURNING MORE AND MORE OF ITS ATTENTIONS toward the communications industry, the Computer Industry Association (CIA) has come up with a recommendation to Congress that AT&T's monopoly be ended and the company split into 24 local operating companies, a Long Lines company and one or more equipment manufacturing companies. At the same time, in testimony before Sen. Philip Hart's hearings on the structure of the telephone industry, CIA spokesmen recommended the FCC be split into two agencies, one to regulate telecommunications and the other for broadcasting.

The CIA said it believes "natural monopolies" no longer exist in the telephone business except at the local exchange level. Terminals, supplies and long lines should be competitive, it said. And the FCC, according to CIA, lacks the resources it needs to police the vast operations of AT&T adequately.

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"THE GRAY SHEET" JULY 23, 1974 • VOL.9,NO.20 P.J.McGOVERN, PUBLISHER

From supercomputers to . . .

MORE THAN EVER, CONTROL DATA IS THE "DIFFERENT" COMPUTER COMPANY AS IT STEERS ITS COURSE TOWARD SERVICES

The easy things in the computer field have been done. It is much simpler to develop computers than to apply them effectively. -- William C. Norris, Chairman and Chief Executive Officer, Control Data Corp.

The guys who build terminals for Lee Way Trucking Co. and who buy up -- by the fistful -- small systems houses like Greenwich Data Systems, architects of the Wizard of Avis, can no longer be pigeonholed simply as the builders of the world's largest computers. They -- the managers of Control Data Corp. -- represent an information processing company with a special view of the future.

In a word, the future is "services." During the past couple of years CDC has been busily expanding its horizons beyond the rather narrow specialty -- very large scale computers -- that launched the company in the 1960s and turned its attention to the problem of using computing power effectively. Data services . . . by which CDC seems to mean any computerized activity that increases human productivity . . . are the "commodities" of tomorrow's computer marketplace in Control Data's view.

CDC's long-range strategy is already paying big dividends. Though its installed base of computer systems and new shipments last year represented only a few percent of the total systems market, these traditional measures of rank in the computer business are no longer as vital to Control Data as they are to the other mainframers. Some of the reasons:

- CDC has become the largest supplier of network services. Revenues from Cybernet and Service Bureau Corp. (now flourishing outside the shadow of IBM, its original parent) reached $130 million last year. More importantly, these services are growing at the rate of 25% a year, far faster than the systems market industrywide. And, except for a small NCR operation, CDC is the only mainframer in the business of supplying network services.

- Quietly gathering the little acorns from which great oaks grow, CDC has been steadily absorbing small systems and software outfits with experience in specific application sectors for which there are proven markets. CDC organizes these in groups to serve specific industries.

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- CDC has become the largest producer of plug-compatible and OEM peripherals, shipping about $200 million worth in 1973. With technical and financial resources that far outstrip those of competing independents, CDC may well emerge as the only viable supplier in this sector of the market.

- Under Norris' guidance, CDC is joining hands with a bewildering variety of helpmates -- from NCR to the Soviet government -- to form cooperative development and manufacturing ventures. CDC says it will go partners with anybody in any facet of its business -- with the all-important exception of marketing.

Meanwhile, the "synergistic" effects of CDC's diverse business activities -- with strong boosts from a merger with Commercial Credit Corp. and from IBM's "gift" of Service Bureau Corp. as a partial anti-trust suit settlement -- have injected renewed life into CDC's lagging revenues. Overall income from computer operations reached $950 million in 1973, jumping more than 25%. And orders placed during the year topped $1 billion for the first time.

In choosing to focus its thinking and marketing around services, CDC may be taking a step ahead of its fellow mainframers. Despite long-standing assertions that it sells "solutions," IBM clearly remains a system-oriented company -- while most of its smaller competitors are content to try making the IBM approach work for themselves. The Giant and its imitators sell hardware and programs in packages that still tend to be bundled up in one basic price, leaving it up to the customer to get as much work out of them as he can.

Unbundling is the key

But not CDC. "Systems is a stupid approach to the market," says Control Data strategist Gerrard Beaugonin bluntly. "Though you need systems to sell services." Control Data's policy of completely unbundling software and hardware prices -- introduced last April with the announcement of its updated Cyber 170 computers -- is one of the keys to putting across CDC's services philosophy, and a good illustration of just what the company means by "services."

Under the new policy, all program products right down to the operating system are sold separately from the "iron," as well as education and applications services. Customers even have the option of buying cold hardware without any accompanying software and designing their own operating systems.

This may not sound like a services approach -- but CDC is convinced that the first step toward selling computing as a service is to make customers aware of exactly where their computer costs are going, all the way down to the job level. Unbundling program products is a step toward forcing users to think in terms of applications instead of computing machinery.

. . . selling productivity is next

Not even this degree of unbundling was enough to satisfy some of Control Data's more gung-ho planners. They suggested that program prices be tied to processor capacity as well as applications . . . so small users would pay less to use a program than customers with faster systems. This scheme, in effect, would have tied costs almost directly to the productivity of the system. And this, CDC is convinced, is ultimately the only realistic way to sell data services.

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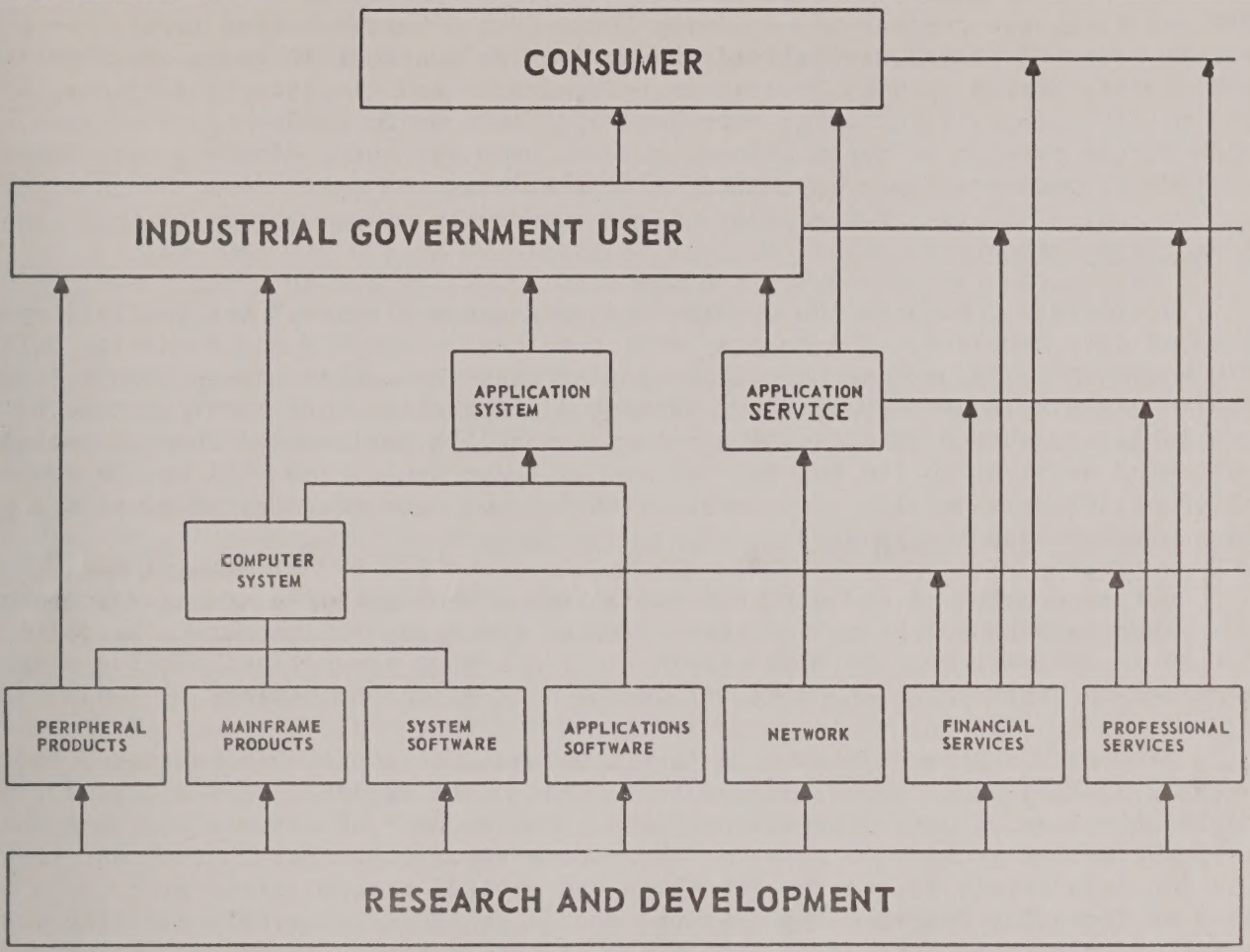

"LEVELS OF SERVICE PARTICIPATION" -- The chart above is CDC's way of showing how it combines its diverse product and service offerings (bottom row) to supply end-user services to business, government and the "man-on-the-street." Aside from the usual array of mainframe and software products, CDC builds peripherals for other manufacturers and users (a lucrative sideline); supplies raw power applications, and transaction services via network; offers financial and insurance services through Commercial Credit and other subsidiaries, and consulting and educational services with a staff of 1.000 specialists. All these offerings may be combined to fill one user's need -- or he might use just one.

CDC management decided customers aren't ready to go that far as yet. "Charging by productivity is painful for users," Beaugonin concedes. "Customers resist." But, he insists, unbundling at that level will be essential in the end to convince users that computing should be regarded as a service . . . not as a capital investment.

Services via networks

When IBM turned over its Service Bureau Corp. to CDC in January of last year for a token $16 million, CDC suddenly jumped ahead of General Electric to become the largest network operator in the world. SBC had long been treated as an afterthought within IBM . . . since the Giant wasn't profoundly interested in the services business . . . but the big interactive network seems to have found an enthusiastic parent in Control Data.

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CDC has turned over operating responsibility for its Cybernet facilities to SBC and is in the process of combining SBC's Call 370 timesharing service -- primarily oriented toward specialized commercial applications in insurance, banking and similar fields -- with Cybernet's remote batch and timesharing services, offering mostly technical and large data base applications on CDC's big mainframes. With little overlap in applications, the two networks unite distinct user bases on common, money-saving communications facilities.

A services factory

Ultimately, CDC sees the combined networks as a "factory" for the full spectrum of data services. The company will continue to use IBM equipment for Call 370 -- though it's seeking more economical arrangements than direct leases from IBM -- and mix IBM and CDC devices without partisanship. All services will be available to users over the common network, possibly implemented through packet-switching services in the future. Joined to these facilities will be the operations of ITT Data Services overseas, which Control Data recently added to its growing roster of acquisitions.

But even when all the physical facilities of the networks are tied together, CDC plans to pursue its applications oriented marketing philosophy. The sales forces of Cybernet and SBC will retain their distinct identities, selling specific services to different users even within the same client companies.

Network operations are the fastest growing segment of CDC's business. And as users' thinking moves steadily away from "What machinery do I need?" toward "What applications can I use?" the attractiveness and economy of network services should keep the market growing much faster than the systems business. Lower cost transmission (via satellite, packet switching and digital transmission) plus CDC's policy of isolating fast-growing data processing applications within specific industries and offering packages to fit . . . all should act together to keep Control Data on the crest of the wave.

Many observers believe, in fact, that IBM's promise to stay out of the services business for six years following the anti-trust settlement was the most valuable asset CDC has. Except for a few large networks that developed as offshoots of large DP operations within companies like GE and McDonnell-Douglas, Control Data has a clear field. And the appearance of serious new competition isn't likely — the establishment of a large network service today requires a huge investment in hardware plus state-of-the-art expertise in communications, system software and user applications.

Common products . . . separate identities

Nothing about CDC's revamped approach to the computer business has raised more eyebrows than its adventures in "cooperation," most notably with NCR. The principle of cooperation -- as CDC outlines it -- affirms Control Data's view of itself as a seller of solutions to highly specialized information processing problems. As such, it jealously guards its customer base and applications expertise . . . but is willing and eager to share the burden of hardware and operating system development with other mainframers or even foreign governments. Among its many moves thus far:

- Sparking rumors of merger, CDC sealed an agreement with NCR for joint production of certain peripheral products through an equally-owned subsidiary called Computer Peripherals Inc. This cooperative effort re-

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cently extended abroad when International Computers Ltd. (ICL), the British computer builder, became a third partner in the venture. ICL's entry is expected to increase CPI's economies of scale as well as provide CDC and NCR with a source of duty-free products for the European market.

- At the same time, CDC and NCR agreed to develop jointly a "swing" processor that would serve as a bridge between NCR's small-scale systems and CDC's large-scale line . . . and eventually provide a basis for a common family of hardware products for each company to sell under its own trademark.

- CDC signed an agreement with Rumania to set up a peripherals manufacturing center there financed by the Rumanian government with CDC's know-how. Resulting products will be sold worldwide by both partners.

- Earlier this year, CDC became the first American computer builder to win a "cooperation" agreement with the Soviet Union. Though terms of the pact . . . and its long-range implications . . . haven't been spelled out, CDC says it wants to use the U.S.S.R. as a "laboratory" for developing applications in such fields as education and health.

- One of Norris' more visionary ventures is Multinational Data, a combine composed of CDC, NCR, ICL and CII to develop standardized computer languages and hardware specifications. Norris is convinced that the smaller manufacturers must unite in common standards to compete with the marketing momentum and economies IBM achieves by creating de facto standards for the industry.

In joining forces with NCR, Control Data made a "conscious decision" to keep its corporate identity separate in the marketplace and carry on partnership activities more or less behind the scenes. As suppliers to distinctly different segments of the market -- even when they're selling to the same companies -- they are determined to maintain their individual marketing and support images. At least for the time being.

Some confusion

At first this rather unique arrangement resulted in a bit of confusion among the partners' salesmen. Robert Duncan, assistant to the president of Control Data Systems and Services, tells the story of a salesman in Japan who called the home office for instructions after he collided with an NCR colleague in a prospect's factory. "Get right back in there and sell," he reportedly was told. Meanwhile the NCR salesman called his boss for guidance and got the same blunt message.

But at the development and manufacturing levels, according to CDC spokesmen, the marriage is already safely past the newlywed stage. The original -- if vague -- plan to develop a "swing processor" has evolved into a "swing operating system" project better suited to the realities of the next generation. Duncan explains that processors are becoming sufficiently cheap and flexible that processor compatibility is no longer the key to "family" living. Today the operating system is emerging as the real kickoff point for system design -- witness Honeywell's Series 60 GCOS and IBM's System Q, projected as the basis for Future Systems. From there, the two companies plan to put together a common product line spanning the range of computer and networking capabilities.

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To accomplish their goal, the partners have created a "unique organizational body" called the Advanced Systems Laboratory (ASL), existing independently of both parents, borrowing personnel from each side and operating under the direction of a joint NCR-CDC steering committee.

ASL's job is to outline specifications for the common products and system software and to set milestones for development. The actual development work is done under contract by suitable groups within both companies. People from both sides have been carefully integrated -- the man in charge of large system development, for instance, is from NCR, while small system development is under the direction of a CDC executive.

Buick and Olds guys

The hoped-for result of ASL's labors will be "a span of systems available to either parent." Each company will be free to market the jointly developed products at whatever time -- and in whatever way -- they choose. Presumably that means that CDC could sell the smaller systems in direct competition with NCR -- but, as Duncan comments, "We'd be crazy to go into their entrenched market. And they haven't much experience in ours." Confused onlookers are urged to think of "the Buick and the Olds guys" as a familiar comparison.

Part of the reasoning behind the venture is that joint development will free CDC experts for the kind of work the company is really interested in -- applications development. "We really don't need a bigger bang for the buck in hardware, though improvements there will keep compounding for quite a few years," says Duncan. "What we need is applications -- and we could get 25% a year price/performance improvement on applications software alone if we put our energies in that direction for a while."

Peripherals too

The "Odd Couple," as they've been referred to more than once, have squeezed more immediate dividends from their joint manufacturing venture in peripherals. For CDC, joint manufacturing means economies of scale. The company took over NCR's disk plant in Hawthorne, CA., along with a 20-year contract to supply NCR's disks. ($40 million worth last year.) And CDC agreed to buy NCR serial printers in return.

Meanwhile, jointly-owned CPI has taken CDC and NCR punchcard, magnetic tape and printer products and "smashed them into one product line." These products are sold only to the parent companies. ICL's entry into the partnership means the difficult "swallowing process" will have to continue -- with metric conversion problems compounding the headaches -- but the partners seem to believe the advantages of commonality are worth the price. So far, CDC is obviously pleased with CPI's progress. Company officials say both the marrying process and production volumes are "significantly ahead of schedule."

A socialist laboratory

Word that CDC had signed a "cooperative agreement" with the Soviet Union brought forth the usual outcries against "giving away" U.S. computer know-how to lagging Communist countries which might use it for military purposes. After all, what could the Russians give in return except money? CDC answers: "People and technology." As Duncan explains it, "The Soviet Union has three million unconfused scientists. They're not experienced computer users; they're not committed

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QUOTABLES FROM A CONTROL DATA STRATEGIST -- Gerard Beaugonin:

+ We have enough generators of computing power . . . now we need some good motors.

+ Will anyone ever come up with a new product line? No -- not even IBM.

+ Services can be a skin cancer on IBM. The more IBM fights something like this, the more help you get . . . because they talk about it.

+ Raw time is not attractive to sell, but the systems salesmen should sell more services instead of complicating our systems job. In five or ten years, even in-house systems will be service organizations.

+ IBM will hold to in-house systems.

+ Every IBM user has a guilt feeling. That's what created the plug-compatible market; it's a compensation for guilt. So was leasing.

+ There's no way we can sustain 20% growth on 5% increases in user budgets . . . unless we provide a way for non-computer people to use them.

+ IBM is on a four or five year product cycle. We (and the rest of the mainframers) are on a ten year marketing cycle. In the interim we just improve performance.

+ IBM isn't our competitor. It's our environment.

+ OEM manufacturing is a response to an environment, not a business.

to our mistakes. We want to use their fresh thinking and their enormous resources in our applications work." And in recent testimony before a Congressional subcommittee, Norris explained, "Control Data does not normally sell technology for cash but will only offer technology where improved access to a market is realized or technology of equivalent or better value is received."

Norris specifically mentioned computer applications in the fields of health care and education, where the U.S.S.R.'s huge, highly centralized organization provides ideal conditions for experiments in computerizing information systems. With the largest population of "basic scientists" in the world, Norris said, the U.S.S.R. should be able to make great contributions to the art of using computers. And out of it all, CDC is determined to reap world-marketable application systems.

On the systems side, CDC believes, Russia lacks the "manufacturing infrastructure" of specialized suppliers necessary for advanced, large scale hardware development -- so there's little danger of serious competition from that quarter in the near future.

The whole octopus

Putting it all together . . . the "whole octopus," as one CDC employee called the hair-raising complexity of his company's operations . . . is beginning to develop into a strongly viable organism with a central idea guiding the movements of its tangled arms. And the "different" computer company expects to have a more familiar look as that idea spreads around.

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• U.S. COMPUTER MANUFACTURERS SEEM TO BE WEATHERING the current economic uncertainties well -- though high interest rates are taking their toll on profits, the latest quarterly reports indicate. All six of the major mainframers reported healthy increases in revenues for the quarter that ended last month over the same period last year.

Even more encouraging were unanimous reports of strong backlogs in orders for data processing equipment. Burroughs said its worldwide backlogs have grown 33% since the beginning of 1974 . . . and Honeywell reported that orders for its new Series 60 family systems have reached the $100 million mark. Control Data said high interest rates have noticeably shifted the balance away from outright purchasing of systems hardware to leasing -- causing a drop in short-term earnings. And IBM hinted that it too expects a return to heavy lease orders to slow down its rate of earnings growth through the rest of the year.

IBM reported quarterly income of $3,260 million, up $713 million over last year. Honeywell's sales were up 14.4% to $654 million; Burroughs' revenues increased 21% to $379 million and earnings jumped a strong 30% to $34 million. Sperry Rand reported sales up 18% to $708 million; CDC income from computer operations rose from $135 million to $162 million over last year's second quarter.

• BURROUGHS WON A VOTE OF CONFIDENCE -- and a fat contract renewal -- from the U.S. Air Force last week. The Air Force extended its "Phase II" Base Level Data Automation Standardization Program for eight years -- a contract estimated to be worth more than $200 million in all. When Burroughs was awarded the original contract for 135 B 3500s in 1969, the deal represented the largest data processing procurement ever. The extended contract provides for the upgrading of some of the overloaded 3500s to larger B 3700s and B 4700s. The Air Force said its Burroughs-based system has shown "tangible" benefits through better control of military resources and comprehensive management reports.

• IBM HAS MADE ANOTHER MOVE TO ENHANCE THE STAND-ALONE attractiveness of its System/7 sensor-based computer, orginally designed mainly for operation under the control of a 370 mainframe. Having beefed up its hardware capabilities last fall, IBM is now offering a new Application Program Generator (APG/7) that runs on a stand-alone System 7. Formerly the package would run only on a larger host computer that composed and transmitted completed applications to the smaller machine. APG/7 is an interactive programming aid that develops application programs through a series of "question and answer" exchanges with the user. From the user's "simple declarative statements" the package assembles programs for monitoring and control operations.

• DATRAN HAS BEEN GRANTED A PATENT covering its digital transmission network. A key element in Datran's system, according to the company, is a switch for synchronous time division transmissions that will let any computer connected to its network contact any other computer "in less than half a second." The solid state switching device will handle switched service for 10,000 customers and up to 80,000 connections per hour. When the network begins offering switched service next year, Datran says, "it will make possible high-performance occasional use data transmission applications that were not practical before."

• IN THE WAKE OF PUBLIC OUTCRY over proposed sales of equipment "useful in crime control" to Communist countries, the U.S. has required such exports to be licensed. Many computer-related devices are included under the new rules.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 2,1974 • VOL.9,NO.21 P.J.McGOVERN,PUBLISHER

Toward computer industry reorganization?

HART SUBCOMMITTEE TAKES INITIAL LOOK AT COMPUTER INDUSTRY: IBM ARGUES 'HANDS OFF' AS MANY WITNESSES SAY IBM DOMINATES

In summertime Washington unusually abuzz from full impeachment hearings by the House Judiciary Committee, not much attention was focussed last week on efforts by the Senate's Judiciary Subcommittee on Antitrust and Monopoly to understand the computer industry . . . especially since the biggest (and concurrent) legal shows in computerland were US vs. IBM being delayed in New York and Telex vs. IBM awaiting second-round excitement in Denver.

Even so, IBM wheeled out its top legal artillery to defend not responding with facts as Senator Philip A. Hart began his first round of hearings about the computer industry. It is one of several major industries being examined in connection with his proposed Industrial Reorganization Act (see page 3).

The Subcommittee's hearings at this time were termed "unfortunate, somewhat unfair, and clearly unnecessary" by Nicholas deB. Katzenbach, IBM vice president and general counsel. Quite rhetorically, he explained the hearings were . . .

= unfortunate, because the Committee deprives itself of expert testimony which would otherwise be available;

= unfair, because, whatever the Committee's intentions, there may be misinformation about, criticism of, and attacks upon IBM which it cannot rebut in present circumstances and which make this record useless as a basis for legislation;

= unnecessary, because all relevant information about the industry will be available to the Committee soon in a far more comprehensive, objective, and useful form.

The former Attorney General then began laying the groundwork for outright attacks on many of the witnesses scheduled to testify. After explaining that he held the Senator in high personal and professional regard -- and that he didn't for a minute believe that members of the federal judiciary could be influenced -- Katzenbach said he believed the Senate hearings would prejudice and damage IBM. They may, he reasoned, "suggest to the general public, to unsophisticated investors, and even to some of our own employees that IBM is guilty of something improper."

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I suggest, Mr. Chairman, that much of the information developed at these hearings will be adverse to IBM; that IBM cannot defend itself at this time in this arena; and that to permit such attack -- indeed, to provide a public forum for it on the eve of a trial important to this country and important, certainly, to IBM and its stockholders is inherently unfair. Not, to repeat, because it will influence the results of the trial, but simply because the trial in and of itself highlights interest in these hearings. There are many -- investors, employees, customers, competitors -- who want to guess the results of this litigation simply because they fear -- it will affect them. And there will be those who do seek to influence public opinion in ways adverse to IBM and who will promote views prejudicial to IBM in every way they can.

. . . McGurk and Biddle of the so-called Computer Industry Association have as the principal objective of their employment to make public attacks upon IBM in the interest of their members, a number of whom are suing IBM in the courts.

. . . two economists [have] testimony closely related to the [Justice] Department's pending case.

. . . two witnesses are employed by Control Data Corporation, an important IBM competitor, which sued IBM on antitrust grounds in a case now settled.

. . . another heads a company which is also in competition with IBM. He has been a frequent public critic.

. . . the two gentlemen from overseas have governmental responsibilities which will inhibit any testimony favorable to IBM . . . [since] a number of European governments . . . are subsidizing and otherwise supporting IBM's European competitors.

As the list continued, EDP Industry Report -- sitting in the audience both reporting and waiting to testify as an early witness -- began to wonder how Katzenbach might categorize the Gray Sheet. He closed this section of his comments, however, saying: "I assume that there may be other witnesses whose names are included on the list in an effort to balance the testimony in some way or other."

Framework for analysis

In presenting its description of the computer industry, EDP/IR made every effort to interject no intentional bias. Using the charts reproduced in this issue, EDP/IR described the computer industry as it has done in print for over 10 years. User spending, installed bases, user acquisition methods, worldwide supply and use of computers were explained as clearly as possible.

A difficult task? Certainly. Impossible? Katzenbach had said "it would be unlikely that this Committee could get any kind of in-depth knowledge . . . in a few hours of testimony, irrespectively of their objectivity or their expertise. The facts about this young and dynamic industry are far more complex . . . than can be comprehended in a few short hours." Following the EDP/IR testimony, Hart said: "That, I think, was a very responsible, self-disciplined kind of analysis. It is not always the case in these hearings that we have a witness who measures up to that.

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PROPOSED "INDUSTRIAL REORGANIZATION ACT"

In March, 1973, Sen. Hart reintroduced S.1167, the Industrial Reorganization Act. The bill is needed, Sen. Hart said at the time, because the Sherman and Clayton Acts "were soundly conceived bills, but they did not contemplate the complex business conditions that exist today. And the acts have been so interpreted over the years that enforcers are sent on distant chases after fox while the chicken coop remains infested with wolves."

The proposed IRA would eliminate the burden of proving how monopoly is bad . . . restating "a basic credo of this country since its inception: Too much power in too few hands is incompatible with democracy." The bill would add "two important new wrinkles to antitrust enforcement procedures."

+ Trustbusters would no longer have to rely on evidence that defendant firms intended to create monopolies to control prices or to exclude competitors. Under the bill, the concern would be less with intent and more with the result of actions.

+ The antitrust enforcement system would "for the first time" be geared to deal with the mechanics of dismantling monopolies -- "a necessary step that the present system has trouble managing."

In addition, the bill establishes a special commission to study concentrated industries and develop plans to make them more competitive . . . and it sets up a special court to hear complaints and determine proposed reorganizations.

The legislation singles out most of the nation's major industries: chemicals and drugs; electrical machinery and equipment; electronic computing and communication equipment; energy; iron and steel; motor vehicles; and nonferrous metals.

Few observers give the Hart Bill much chance of passing as it exists; many, however, believe the subcommittee's extensive hearings will lead to legislation of some sort. As the bill now stands, possession of monopoly power (and grounds for reorganization under the bill) is defined as follows:

"(a) It is hereby declared to be unlawful for any corporation or two or more corporations, whether by agreement or not, to possess monopoly power in any line of commerce in any section of the country or with foreign nations.

"(b) There shall be a rebuttable presumption that monopoly power is possessed:

"(1) by any corporation if the average rate of return on net worth after taxes is in excess of 15 per centum over a period of five consecutive years out of the most recent seven years preceding the filing of the complaint, or

"(2) if there has been no substantial price competition among two or more corporations in any line of commerce in any section of the country for a period of three consecutive years out of the most recent five years . . ., or

"(3) if any four or fewer corporations account for 50 per centum (or more) of sales in any line of commerce in any section of the country in any year out of the most recent three years preceding the filing of the complaint. ...

"(c) A corporation shall not be required to divest monopoly power if it can show:

"(1) such power is due solely to the ownership of valid patents, lawfully acquired and lawfully used, or

"(2) such a divestiture would result in a loss of substantial economies."

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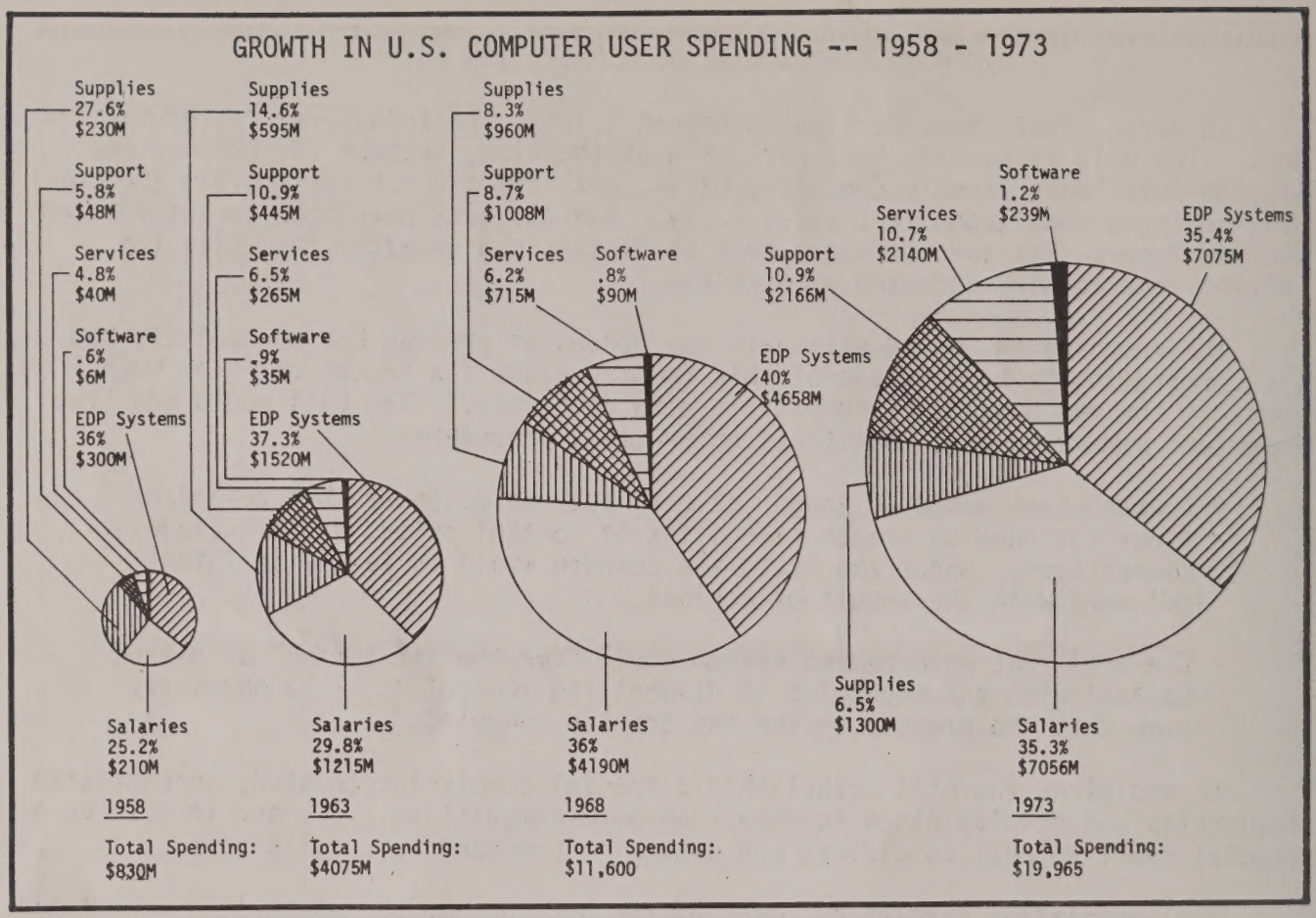

How complex is it?

As the charts above (indicating the different "pockets" of end-user spending for computing), and the one on page 6 (suggesting the many vendors and acquisition methods involved in slicing the systems portion of the spending pie) illustrate, the computer industry is complex. No doubt about it. Virtually every witness at the four-day "Hart Hearings" made this point . . . explicitly or implicitly.

In addition to stating this, Katzenbach further complicated the matter by suggesting the government "articulate the philosophy which underlies our governmental policies toward business competition and the factors which should be taken into consideration in its enforcement." Rather than simply protecting competitors from the rigors of tough competition, he continued, the philosophy must take into account factors such as new technology, industrial maturity, the shrinking world, and the ability to compete in world markets. He also questioned the growth of private treble damage suits where issues involve structure and the huge financial stake lawyers have in decisions. He made this pitch because "members of this Committee, all distinguished lawyers, understand why it would be improper for me as counsel to testify publicly about any of the issues in pending cases."

Other witnesses, for the most part, attempted to shed light on the issues. Most of them submitted detailed background documents, portions of which were read or amplified during the open hearings:

A.G.W. ("Jack") Biddle, executive director of the CIA, used documents from the Telex vs. IBM trial to illustrate IBM's dominance and "monopoly control" of

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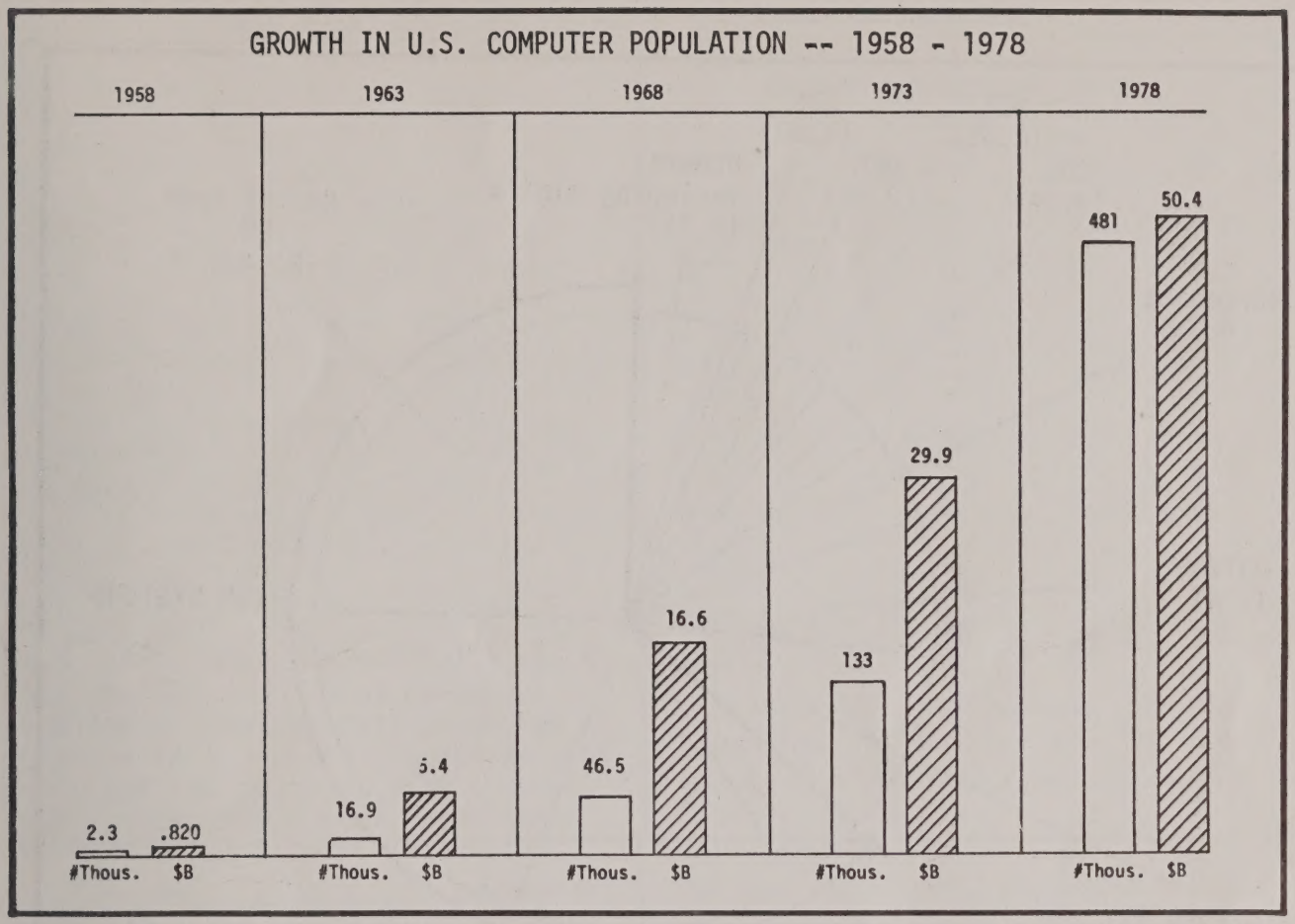

the computer industry. Recalling how, as a consultant, he advised Bendix some 15 years ago to forget the computer industry, suggested that IBM today has vast potential "juggler" power over the nation's economy. In closing, he said that "should the Congress fail to deal effectively with monopolization of the computer industry, the nation will be exposed to potentially massive economic harm resulting from unfettered abuse of the dominant firm's market power." Eventually, he said, "America will be faced with an unthreatened one-firm computer industry as complacent, as un-innovative, and wasteful as the "legally monopolized" telephone industry has already been allowed to become.

Dan L. McGurk, CIA president, stressed the nature of rental-based business, reviewed IBM's antitrust history, and said "it is patently clear that current laws do not provide a timely solution or a basis for restructuring." After discussing the problems with restructuring, he closed with the suggestion that a "restructuring tax credit," comparable to the investment tax credit, be established. A public company divesting itself of a subsidiary by distributing shares to stockholders would be permitted to take credit (some percentage of assets so transferred) against income tax for ten years. Finally, pursuing his penalties for bigness theme, McGurk suggested a progressive corporate income tax.

Ralph E. Miller, an economist who consulted with CDC during its litigation days and now is working with the Justice Department, suggested three layers of restructuring. The first would require divestiture of IBM's Office Products, Information Records, and Federal Systems divisions. Next, he would require that IBM's computer operations be broken into separate companies producing "small information processing systems, peripheral equipment, electronic components, and

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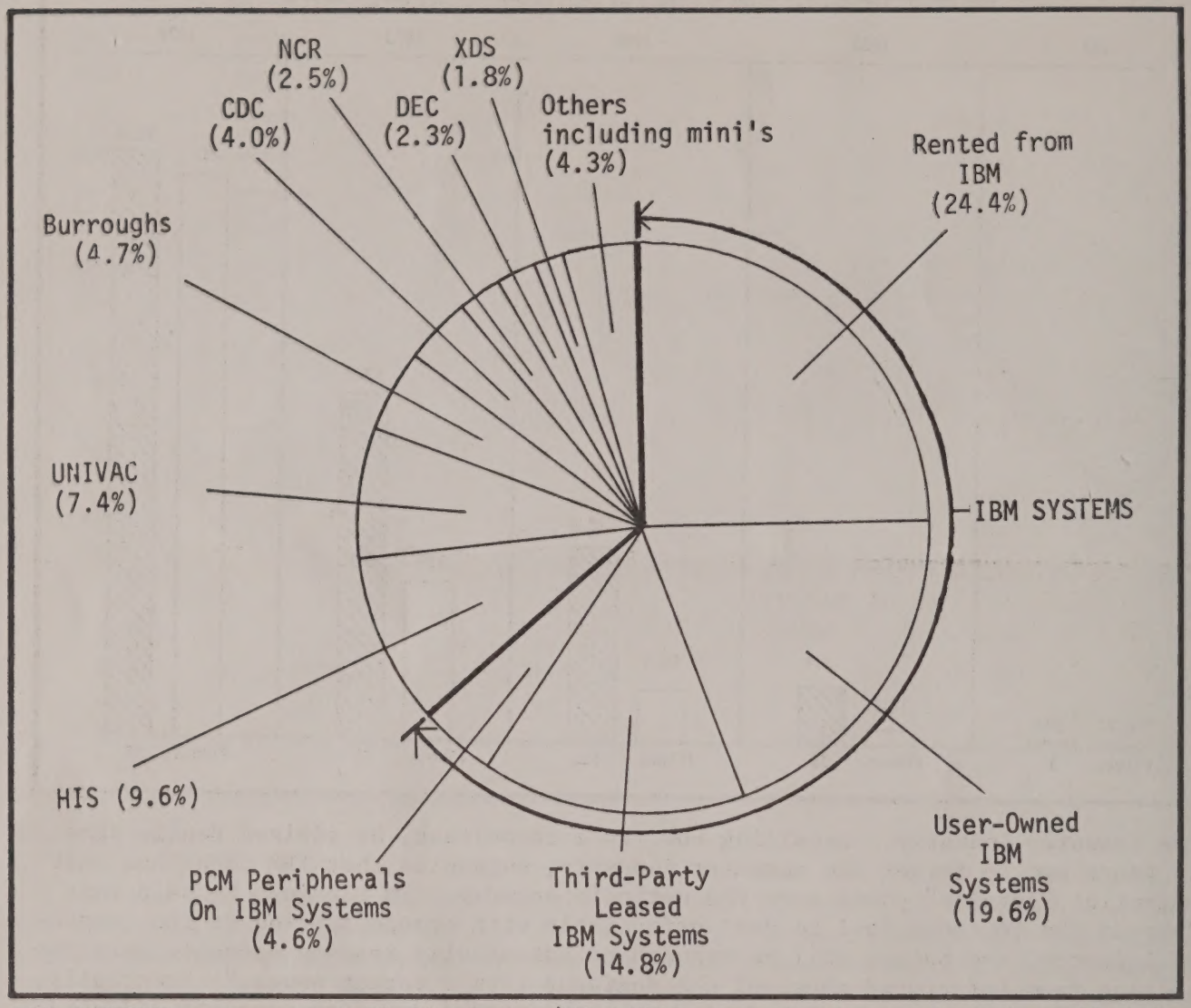

IBM SYSTEMS represented 63.4% of the $30 billion worth of computers installed in the U.S. at yearend 1973, but only 38.5% of these (just under one-fourth the total installed base) were owned by IBM and rented to customers. Another cut of the 1973 IBM systems base shows 7% built by PCMs; 5% over 10 years old (pre-360); 13% small or control (System/3 or System/7); 32% System/360; 43% System/370

software and supporting services." The third split would be along horizontal lines, including divestiture of computer system manufacturing facilities, lease base, R&D facilities, and capital to at least four or five separate companies. World Trade might be left alone, but prevented from entering U.S. markets.

Gerald Brock, a professor from the University of Arizona, suggested IBM be split by functions -- making separate companies out of the production of CPUs, peripherals, maintenance, and marketing functions. Following this, he said, "if IBM were really more efficient, it would continue to dominate. However, it could not use power in one area to manipulate standards or price ratios in order to fight competitors in another area. Neither could one activity subsidize another because they would be separate companies." A similar situation exists in the minicomputer area, he added. "The lack of competitiveness in the main computer industry is a result of integrated systems selling rather than concentration in itself."

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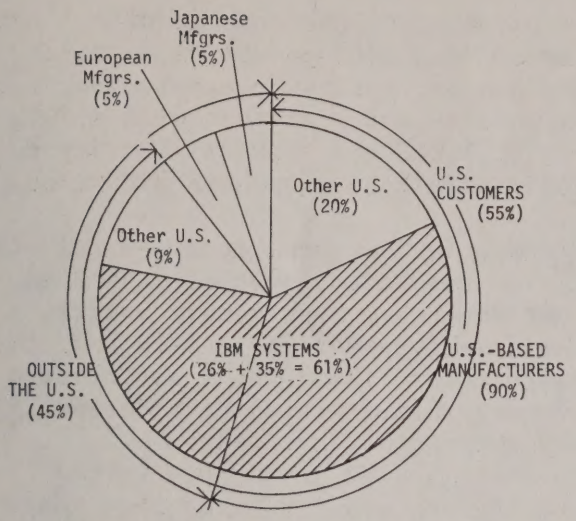
WORLDWIDE DISTRIBUTION AND UTILIZATION OF COMPUTERS



U.S.-BASED MANUFACTURERS built about 90% the $50+ billion of computers installed in non-Communist countries at yearend 1973; but U.S. customers used only 55% the computers. IBM systems represented 61% all user investment

COMPARISON OF GNP TO VALUE OF COMPUTERS

	12/73-$M Inst. Base	1972-$B GNP (a)	EDP-% GNP
Japan	4,922	341	1.44
W. Germany	3,772	292	1.29
United Kingdom	3,231	152	2.13
France	3,012	221	1.36
USSR	2,195	549	0.40
Canada	1,530	103	1.48
Italy	1,329	118	1.13
Australia	643	52.7	1.22
Netherlands	642	50.0	1.28
Switzerland	579	35.6	1.63
Sweden	459	43.7	1.05
Denmark	388	22.7	1.71
Belgium	338	38.8	0.87
Brazil	330	49.8	0.66
Spain	324	50.7	0.64
So. Africa	233	19.1	1.22
Austria	181	22.8	0.79
Mexico	150	39.6	0.38
Norway	143	16.2	0.88
Yugoslavia	135	23.7	0.57
All Other International	1,475	942	0.16
Total International	26,011	3,184	0.32
United States	29,942	1,155	2.59
Worldwide Total	55,953	4,339	1.29

(a) U.S. Dept. of State, Bureau of Intelligence & Research

Royden C. Sanders, Jr., president of Sanders Associates, expressed his concern with IBM's recent entry into the satellite communications field. "The potential for harm is far too high to allow any relationship between IBM as a supplier of communications services, and IBM as a supplier of business or terminal equipment utilized in conjunction with those communications services."

Eugene K. Collins, director of research for Evans & Co., emphasized the importance of a competitive computer industry to national defense and continued economic and technological development. Restructuring is extremely complex, he said, but the computer industry is still "the most exciting on the U.S. scene today. Without IBM, it would attract vast quantities of capital." But until something is done, the investment community fears IBM's large technological reserve.

Marilyn Walter-Carlson, vice president and associate director of research for Shareholders Management Co., focussed on the components aspect of IBM's business. Spinning off IBM's components division, she said, would restore normal competitive relationships within the semiconductor industry.

James Peacock, editor of EDP/IR, described the computer industry using the charts in this issue and a detailed background document. He suggested that a still-growing industry might rectify inequities if proper rules are laid down and followed; he cautioned that the answers offered by one group might work to the detriment of other industry participants. Most important, he urged Subcommittee members to recognize the investment users have made -- not so much the dollars, they get value from their $30 billion worth of computers -- but in the skills captured and problems analyzed. "No matter what happens, users can't afford to toss out these captured skills. This means they must have confidence in the future of their computer equipment manufacturer -- no matter who it is."

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• A QUADRILLION BITS ON-LINE? Precision Instrument Co. has come up with a modular, "marketable" version of its Unicon 690 laser mass storage device -- which almost pushed the company into bankruptcy. The new machine, with updated hardware and more flexible configuration possibilities, lets a user start out with a 200 megabyte, 100 millisecond access system costing $375,000 and grow all the way to 136 trillion bytes (that's 1,100,000,000,000,000, bits!) by attaching additional read/write boxes to the original controller.

Now under new management -- and with new financial backing in its pocket -- PI believes the Unicon 190, as it's been named, is ready to break open the egg of the yet-unhatched mass memory market. After a long and expensive research effort, the company was able to sell only one monolithic Unicon 690 -- now in use as a mass store for Illiac IV -- but PI says it now has three orders for Unicon 190s. Customers include Union Carbide and the Department of Defense. And deliveries start by the end of this year.

Unicon stores data on coated strips of film about three inches wide by three feet long. Spots representing bits are burned onto the surface by laser and read out again by reflected light. The spots are so small -- about the size of a particle of cigarette smoke -- that one strip will hold 200 megabytes, the capacity of IBM's 3330 double density drive. Mounted automatically on a drum, one strip serves as a random access, 100 ms memory.

A single read/write box stores 80 strips (16,000 megabytes), and up to eight read/write mechanisms can be attached to a single Interdata mini-based controller. On command from the host computer, Unicon can find and mount any strip in five to seven seconds and read data at the rate of 400,000 bytes per second. PI claims an error rate of one bit per billion. Data stored by the laser cannot be erased. But this is a selling point as far as PI is concerned. The recording medium is so cheap -- $21 per strip -- that users can afford simply to write updated files afresh. This eliminates accidental loss of files and provides users with a complete record of file changes.

PI's new president, Raymond E. Wakeman -- who moved over from Tymshare and helped get $3.5 million in venture capital from Heiser Corp. -- believes Unicon 190 can capture some of the market for large disk systems as well as replace tape libraries and open up new applications. He also thinks the 190 may prod IBM into releasing its tape-based mass storage device ("Project Tulip") as a commercial product. "We don't want to rumble Big Daddy yet," he said, "but a response from IBM will help us grow once we're underway."

• A PLUG-COMPATIBLE COMPETITOR TO MA BELL'S controversial Dataspeed 40 has been introduced to the terminal market by International Communications Corp., a subsidiary of Milgo Electronics. Called the ICC 40+ Data Display System, the new CRT/keyboard terminal claims the advantage of "limited programmability" over AT&T's offering and is available at comparable rates on a two year lease. But ICC admits it can't match Dataspeed's phenomenally low purchase and OEM prices -- which start at $2,300 in small quantities and reportedly are half that amount OEM. "Something is out of whack there," said the product manager for the ICC 40+, joining the chorus of independents who believe AT&T is "cross-subsidizing" its product.

• WHILE A FEW COMPETITORS AND THE U.S. GOVERNMENT make headlines by taking IBM to court, the Giant hasn't lost its talent for calming irate small fry with quietly negotiated cash settlements. Ampex just got $13 million without going to court over a patent claim -- and rumors of similar impending settlements abound.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 28,1974 • VOL.9,NO.23 P.J.McGOVERN,PUBLISHER

The microscope

MICRO VERSUS THE MINI . . . IS THERE A CONTEST?
MINI SHIPMENTS NOT THREATENED AS MICROPROCESSORS STAKE OUT NEW TERRITORY

Microprocessors are in. Nobody's quite sure of the numbers, but everybody sees nearly an exponential growth curve for the tiny technological prodigy . . . say from $50 million shipped this year to $800 million by 1980. And with low-cost 8 and 12 bit processors a reality -- and 16 bit manipulators sure to be so in a few months -- there's a natural concern in minicomputer circles. What will the shape of that growth curve do to the shape of the mini market?

Not much, it seems. For all the companies now running in the micro race -- from the big semiconductor house Texas Instruments and microprocessor pioneer Intel to the minicomputer leader DEC -- upcoming shipments of minicomputers should be little affected by the proliferating micros. Instead, the "processor-on-a-chip" seems to be angling primarily into areas new to computerized control . . . tapping user fields out of reach of the minicomputer makers.

As one microprocessor engineer put it, "You aren't going to find people unbolting a mini to put in a microprocessor." Rather, as one of his industry counterparts felt, there will be a "merging with the minicomputer business." EDP/IR and analysts at International Data Corporation (IDC), our publisher, agree. IDC's in-depth probing of the microprocessor revolution and the semiconductor industry shows that:

- 1974 shipments of general-purpose computational type minis -- about half of those going out -- will hardly be impacted at all. These are high "value-added" items which go mostly to end users with little inclination to fiddle with bare-bones microprocessors.

- The remaining minicomputers are more susceptible to "bumping" by their petite cousins, but still only to the tune of $30 to $45 million (10% to 15% of a $300 million crop) at most, nil at least.

- Microprocessors seem to be thriving in the exploration of new applications . . . especially industrial control, data entry devices, modems, and anywhere else it's cheaper to use a microprocessor than a general-purpose mini. The future could find micros in such diverse places as in the home washing machine, on the electronic football field, or even someday under the hood of the family car.

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The impact of microprocessors on the mini market is cushioned even further by the fact that some of the expected $50 million worth of microprocessors to be shipped this year will go right to the receiving docks of the mini makers themselves . . . to re-emerge as microcomputers under a new label. Such products as DEC's modular MPS system based on an Intel 8008 processor chip and General Automation's LSI 12/16 and LSI 16/25 microcomputers built around Rockwell's exotic silicon-on-sapphire chip just go to show the mini makers' "if you can't beat 'em, join 'em" adaptability.

The micro buyer's dilemma

Three years ago, riding on the crest of the MOS-LSI technological wave, Intel introduced the first microprocessor . . . the 4 bit 4004 processor on a single .11"x.15" silicon chip. Now, only three years later, microprocessors are into what at least one manufacturer claims is their third generation. For users looking for low-priced manufacturing controls with a dab of logic, or terminal builders hoping to raise the IQ of their product, the microprocessor comes as the answer to a past history of hardwiring ICs, customizing MOS-LSI chips, or doing without.

But now users are faced with a different problem. The panoply of products available is so varied -- in data word size, type of semiconductor technology, level of compatibility for integration into his own product, and price -- that choosing can be a juggling act that involves the user's needs, his in-house expertise with software and hardware, time factors, and foresight into an industry future where the visibility range can sometimes be less than lead times.

For example, a quantity user can take a bare-bone 8008 microprocessor from Intel ($60), add a 2K bit programmable Read Only Memory (ROM) priced at $40, hook up 32 1K bit Random Access Memories (RAM) at about $11 each, and incorporate the whole $440 worth of chips into his product. Or he can lay out $3540 for the Intellec 8 microcomputer system . . . Intel's tabletop total system rendition of the same 8008 chip and comparable memory but with I/O module, power supply, software, chassis, interfacing, etc. And, the actual optimum trade-off point between component costs and user development/interfacing costs may lie somewhere between the "raw" chip and total system levels.

The question, of course, is how much the user wants to get involved with the nitty-gritty of putting his microprocessor to work. Is he capable -- or does he even want the hassle -- of developing control logic, microprogramming, designing interface circuitry, and writing system software or not? Can he afford development time?

Many users can't. And here -- at the systems level -- the mini makers may prove to have an advantage since they are more conversant with end-user problems, understand the systems market, and are somewhat more applications-oriented than most basic chip suppliers. Those chip makers hoping to "end-around" the systems-oriented firms into the low-end mini market are adjusting to the trend . . . by coming up with their own systems and software/testing support like Intel and National Semiconductor, or, like Rockwell, at least systems-orienting their new-generation chips with more micro-instructions, I/O LSI controllers, and interfacing features. So they're working on it, but how much their efforts will woo minicomputer prospects into microcomputer showrooms -- as opposed to supporting that growth curve with marketing targets not really in the mini makers' sights -- remains to be seen.

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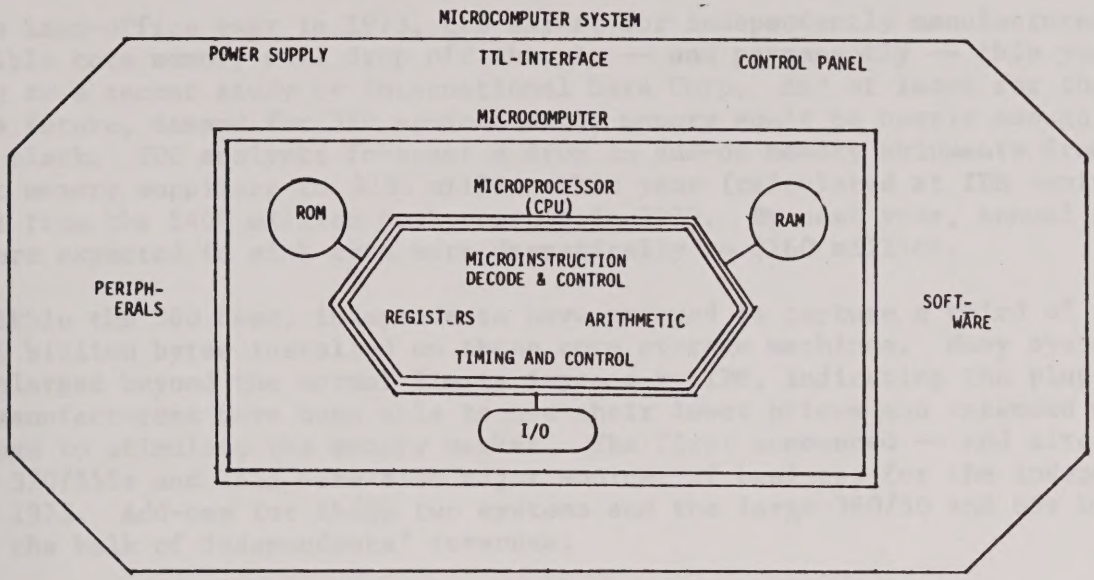
CONSTRUCTION OF A MICROCOMPUTER SYSTEM



Note that each level -- CPU to Computer to System -- requires certain interface circuits, different micro/software system programming levels, and "value-added" to the basic processor.

Investment in technology . . . and shifting product lines

Much of the future success of the chip makers lies in the outcome of the technological race now underway, and two of the more innovative bettors are:

+ Rockwell/General Automation with their jointly developed silicon-on-sapphire chip. The advantage of using sapphire is that it allows for much faster cycle times; the disadvantage is that it's a process still not well understood.

+ RCA is combining the two standard chip technologies -- which provide different electrical charges on the silicone substrate -- into one, hoping to have a chip in production early in 1975. The hybrid will take less power than conventional chips and work well in a hot, noisy environment.

Intel, who claims to have sewn up about three fourths of the chip market, illustrates that the rewards for innovation can be substantial. But marketing state-of-the-art products has its hazards, too: choosing the right technology early, insuring compatibility of follow-on products, and keeping up with the market without eating into your own customer base with a new product.

As for the minicomputer manufacturers, if their current shipments won't be affected by the microprocessor revolution, at least the prices and eventual look of their product lines will. Like DEC and GA they can choose to co-opt the technology for their own uses, or, like Hewlett Packard they can ignore it and focus on the lower end of mainframer markets. But when the 16 bit "processor-on-a-chip" hits the street in a year or two (and after that the 32 bit machine) then look for a radical change in product architecture, if not a rearrangement of the industry hierarchy.

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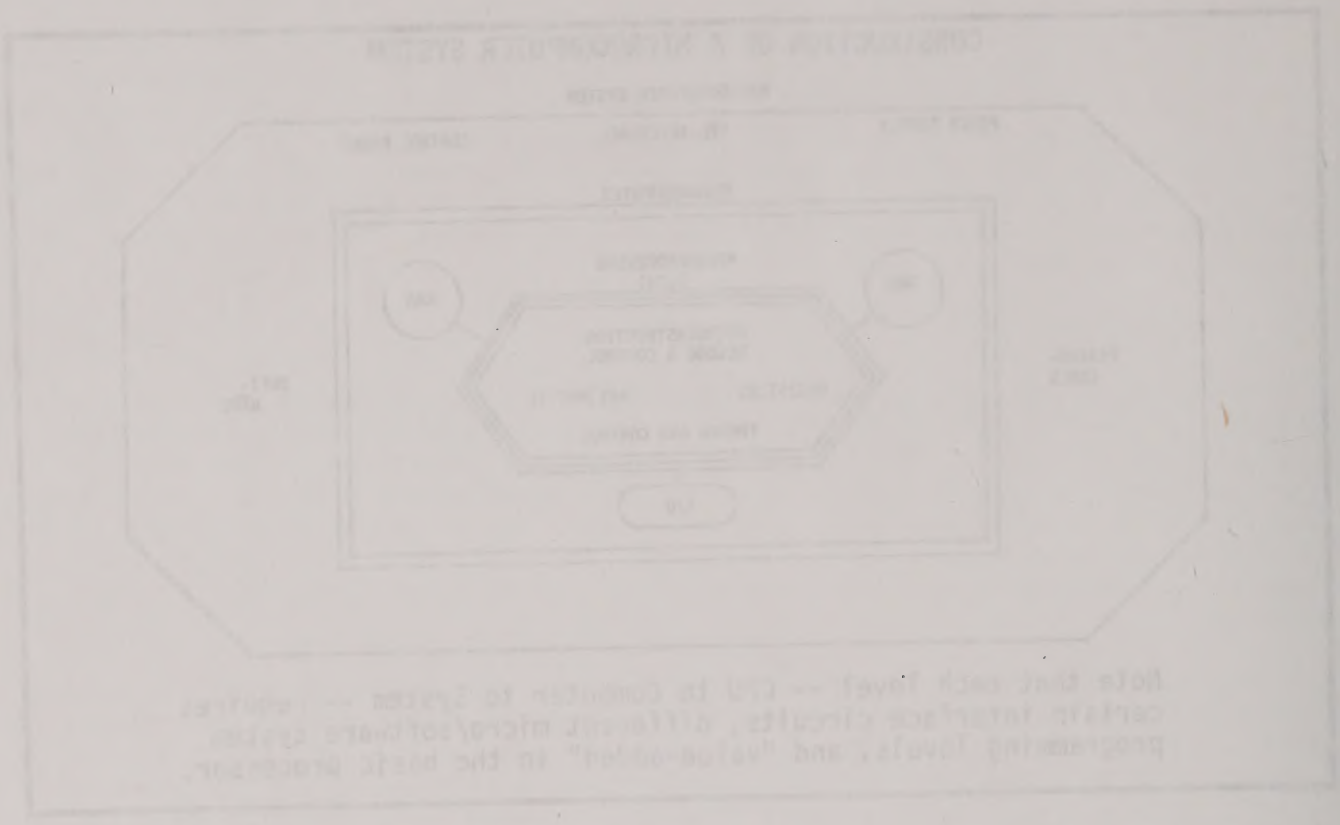

HARD TIMES ARE FORECAST FOR INDEPENDENT MEMORY MANUFACTURERS

After a land-office year in 1973, the market for independently manufactured IBM compatible core memory will drop off sharply -- and permanently -- this year, according to a recent study by International Data Corp. And at least for the immediate future, demand for 370 semiconductor memory won't be nearly enough to pick up the slack. IDC analysts forecast a drop in add-on memory shipments from independent memory suppliers to $280 million this year (calculated at IBM equivalent prices) from the $400 million peak reached in 1973. By next year, annual shipments are expected to sink even more dramatically to $160 million.

Within the 360 base, independents have managed to capture a third of the total 1.4 billion bytes installed on these core storage machines. Many systems have been enlarged beyond the normal limits imposed by IBM, indicating the plug-compatible manufacturers have been able to use their lower prices and extended memory offerings to stimulate the memory market. The first announced -- and already obsolete 370/155s and 165s were also major sources of business for the independents during 1973. Add-ons for these two systems and the large 360/50 and 65s have generated the bulk of independents' revenues.

But the era of core -- at least for large scale computer memories -- is over. Users of 360s and 370/155 or 165 who've decided to weather the virtual storage generation without changing mainframes will keep buying additional core for another year or two; but the steadily shrinking buyer base, stiff competition and the uncertain future for this market will make the core memory business unpromising even for the most enterprising independents.

On the other hand, the IDC study indicates, the total number of bytes and dollar value of independent core memory on IBM systems will stay fairly stable through 1976. Rapid retirement of these systems -- installed 360s are expected to drop to half their current number by then -- will be balanced by steady increases in the average bytes installed on the surviving machines.

The 370 question

Whether the independents can make a bonanza out of the 370 base remains in serious question. But it seems clear that this market won't be as profitable as the core business -- and won't heat up in time to bridge the generation gap without a drastic falloff. Models in the 370 line come bundled with much more memory than their 360 predecessors, and IBM has priced its own add-on boxes much more competitively this time around.

The main hope of the independents for the long run seems to be the 370/145. Nearly 3,000 of these are now in the field and virtual storage users seem to be discovering they need more, rather than less main memory to handle VS environments efficiently. As IBM itself expressed it in a press release announcing that 145 memory limits have been doubled, "increased storage capacity may improve virtual storage processing efficiency by allowing users to keep more critical data ready for processing in main memory." And by putting its imprimatur on expanded 145 memory, IBM may make life easier for plug-compatible salesmen.

Several independents have announced add-on semiconductor boxes for 370 models and typically claim to offer savings ranging from slight to significant -- 10% to 40% for Cambridge Memories STOR 145 boxes, for instance. In most cases, the independents also claim to offer completely "transparent" devices that in no way

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF JULY 1, 1974

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	B-200 Series	$ 5,600	11/61	95	71	166	X
	B-300 Series	$ 5,200	7/65	355	70	425	X
	B-500	$ 6,000	11/68	450	440	890	X
	B-705/711	$ 1,300	3/73	170	90	260	160
	B-1712	$ 1,950	8/72	175	75	250	110
	B-1714	$ 2,200	8/72	275	150	425	175
	B-1726	$ 5,300	2/73	185	45	230	130
	B-1728	$ 7,700	8/73	50	20	70	70
	B-2500	$ 8,200	2/67	220	130	350	X
	B-2700	$ 8,700	8/72	125	85	210	85
	B-3500	$ 14,700	5/67	600	335	935	X
	B-3700	$ 20,000	11/72	55	18	73	35
	B-45/4700	$ 27,000	10/71	135	90	225	63
	B-5500	$ 35,000	3/63	85	30	115	X
	B-5700	$ 29,500	12/70	21	6	27	6
	B-65/6700	$ 50,000	11/69	73	58	131	14
	B-7700	$120,000	8/73	7	2	9	11
	Subtotals			3,076	1,715	4,791	859
Control Data Corp.	G-20	$ 19,600	4/61	3	5	8	X
	1604/A/B	$ 42,000	1/60	17	4	21	X
	31/3150	$ 9,000	12/64	85	49	134	X
	3170	$ 17,500	12/70	13	15	28	X
	3200	$ 14,700	5/64	47	44	91	X
	3300	$ 28,800	9/65	117	90	207	X
	3400	$ 23,700	11/64	4	8	12	X
	3500	$ 26,000	1/69	10	17	27	X
	3600	$ 48,000	6/63	18	15	33	X
	3800	$ 53,000	12/65	19	3	22	X
	6200	$ 42,600	11/70	2	6	8	X
	Cyber-72	$ 48,400	10/71	21	37	58	11
	Cyber-172	$ 41,200	1/75	-	-	-	NA
	6400	$ 59,600	5/66	57	49	106	X
	Cyber-73	$ 52,100	3/72	9	30	39	8
	Cyber-173	$ 54,600	1/75	-	-	-	NA
	6500	$ 78,800	12/67	20	12	32	X
	6600	$105,300	8/64	60	30	90	X
	Cyber-74	$ 93,000	3/72	3	6	9	3
	Cyber-174	$ 67,500	1/75	-	-	-	NA
	Cyber-175	$ 84,000	1/75	-	-	-	NA
	6700	$107,000	7/70	3	0	3	X
	7600	$125,000	1/69	13	6	19	X
	Cyber-76	$125,000	3/72	2	3	5	2
	Star-100	$250,000	12/73	1	0	1	3
	Subtotals			524	429	953	27 +
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	16	8	24	X
	1040/1050	$ 13,300	10/67	176	70	246	18
	1055	$ 22,000	12/71	25	9	34	10
	1070/1077	$ 30,000	6/72	16	2	18	6
	Subtotals			233	89	322	34
Honeywell	Gamma-10	$ 2,500	7/64	0	990	990	X
	Gamma-30	$ 9,900	2/62	0	147	147	X
	G-53 Series	$ 1,550	1/66	660	3,000	3,660	200
	G-100 Series	$ 4,000	4/66	260	1,510	1,770	X
	G-200 Series	$ 13,700	4/61	187	53	240	X
	G-405/410	$ 9,000	2/68	18	8	26	X
	G-415/420	$ 14,000	5/64	130	188	318	X
	G-425/430	$ 17,000	6/64	37	100	137	X
	G-435/440	$ 22,000	9/65	94	48	142	X
	G-615	$ 55,000	6/69	4	22	26	X
	G-625	$ 65,000	4/65	2	3	5	X
	G-635	$ 80,000	5/65	44	18	62	X
	G-645	$120,000	7/66	2	1	3	X
	G-6025	$ 21,800	11/73	20	7	27	35
	G-6030/40	$ 33,000	6/71	80	110	190	31
	G-6050/60	$ 46,500	7/71	61	46	107	27
	G-6070/80	$ 61,500	7/71	31	13	44	11
	G-6180	$100,000	2/74	2	0	2	4
	G-Subtotals			1,632	6,264	7,896	308
	H-105	$ 2,500	11/71	580	130	710	130
	H-110	$ 2,600	9/68	145	170	315	X
	H-115	$ 5,300	3/70	850	385	1,235	95
	H-120	$ 4,600	1/66	350	165	515	X
	H-125	$ 7,900	12/67	75	300	375	X
	H-200	$ 6,400	3/64	450	225	675	X
	H-2020	$ 2,350	2/73	340	35	375	130
	H-2030	$ 5,050	1/73	60	9	69	24
	H-2040	$ 9,000	4/72	295	100	395	90
	H-1015	$ 12,500	4/71	110	60	170	17
	H-2050	$ 14,100	4/72	175	50	225	50
	H-12/1250	$ 12,000	2/66	300	155	455	X
	H-2015	$ 17,800	2/71	115	55	170	25
	H-2060	$ 18,500	4/72	78	14	92	21
	H-2200	$ 19,600	1/66	120	46	166	X
	H-2070	$ 23,000	5/72	53	7	60	14
	H-3200	$ 26,900	2/70	62	28	90	X
	H-4200	$ 31,000	9/68	27	5	32	X
	H-2088	$ 44,000	4/72	5	1	6	2
	H-8200	$ 73,000	2/69	22	4	26	X
	H-4/1400	$ 13,200	12/61	25	24	49	X
	H-800	$ 28,500	12/60	33	11	44	X
	H-1800	$ 46,000	7/64	7	4	11	X
	H-Subtotals			4,277	1,983	6,260	598
	HIS-Totals			5,909	8,247	14,156	906

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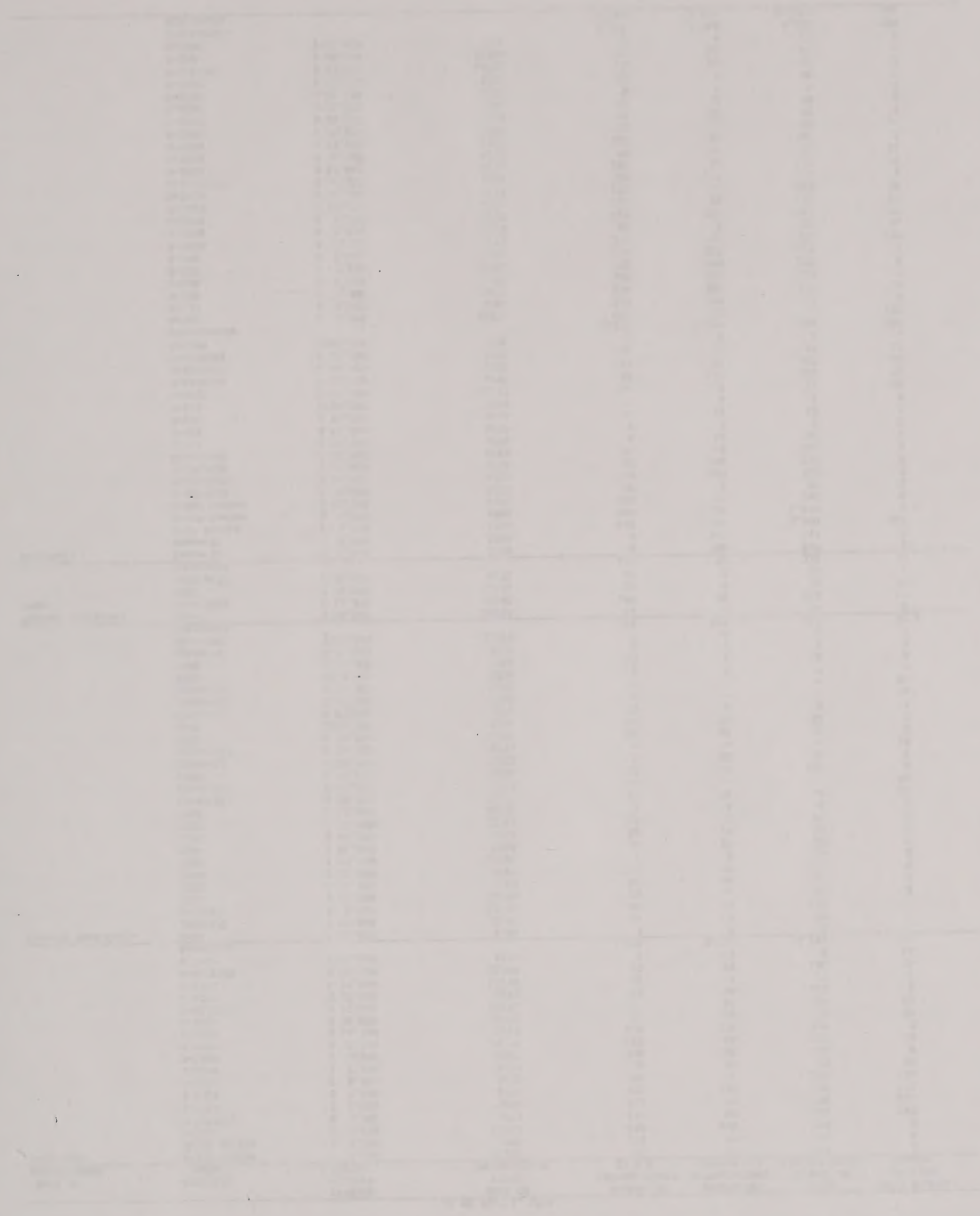

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IBM	System 3/6	$ 1,700	12/70	2,800	1,615	4,415	840
	System 3/10	$ 2,480	1/70	15,135	6,560	21,695	2,410
	System 3/15	$ 4,550	3/74	325	35	360	1,300
	360/20	$ 3,600	12/65	3,000	4,650	7,650	X
	360/22	$ 5,800	7/71	950	310	1,260	X
	370/115	$ 6,650	4/74	300	200	500	1,800
	360/25	$ 7,500	10/68	625	1,075	1,700	X
	370/125	$ 9,800	6/73	1,245	660	1,905	1,400
	360/30	$ 11,000	6/65	2,875	2,310	5,185	X
	370/135	$ 16,225	5/72	2,510	1,315	3,825	1,300
	360/40	$ 19,400	6/65	1,375	1,625	3,000	X
	360/44	$ 14,200	7/66	63	81	144	X
	370/145	$ 27,800	7/71	1,830	930	2,760	700
	360/50	$ 32,100	8/65	625	525	1,150	X
	370/155	$ 53,350	2/71	915	550	1,465	X
	370/158	$ 59,200	5/73	400	125	525	675
	360/65	$ 68,000	11/65	450	215	665	X
	370/165	$ 95,000	6/71	170	76	246	X
	370/168	$110,200	7/73	100	20	120	180
	360/67	$112,000	6/66	40	14	54	X
	360/75	$ 94,000	1/66	32	15	47	X
	360/85	$141,000	10/69	5	4	9	X
	360/9X	$150,000	11/67	14	2	16	X
	370/195	$194,600	3/71	20	4	24	7
	1130	$ 2,300	2/66	2,600	1,850	4,450	X
	1401	$ 3,700	9/60	1,000	910	1,910	X
	1401-G	$ 2,300	5/64	80	33	113	X
	1401-H	$ 1,300	6/67	41	42	83	X
	1410	$ 17,000	11/61	93	54	147	X
	1440	$ 4,700	4/63	210	215	425	X
	1460	$ 9,800	10/63	53	38	91	X
	1620	$ 2,700	9/60	310	225	535	X
	7010	$ 26,000	10/63	13	7	20	X
	7030	$160,000	5/61	3	1	4	X
	704	$ 32,000	12/55	1	1	2	X
	7040	$ 25,000	6/63	9	15	24	X
	7044	$ 36,500	6/63	8	10	18	X
	705	$ 38,000	1/56	3	3	6	X
	7070-74	$ 27,000	3/60	98	35	133	X
	7080	$ 60,000	8/61	47	1	48	X
	7090-94	$ 70,500	8/60	68	10	78	X
	Subtotals			40,441	26,366	66,807	10,612
NCR	Century-50	$ 1,950	2/71	1,050	145	1,195	170
	Century-100	$ 2,980	9/68	980	880	1,860	X
	Century-101	$ 2,750	10/72	695	50	745	225
	Century-151	$ 3,500	2/75	–	–	–	NA
	Century-200	$ 7,900	9/69	685	365	1,050	55
	Century-201	$ 7,000	8/74	–	–	–	NA
	Century-251	$ 10,000	11/73	45	15	60	75
	Century-300	$ 20,000	2/72	32	19	51	16
	304	$ 10,000	1/60	5	0	5	X
	310	$ 1,000	5/61	13	10	23	X
	315	$ 5,000	5/62	320	265	585	X
	315-RMC	$ 11,800	9/65	54	44	98	X
	390	$ 800	5/61	245	155	400	X
	500	$ 1,100	10/65	740	1,510	2,250	X
	Subtotals			4,864	3,458	8,322	541
Philco	1000	$ 7,000	6/63	15	1	16	X
	210/211	$ 40,000	10/58	9	1	10	X
	212	$ 52,000	1/63	8	1	9	X
Singer	System 10	$ 2,500	10/70	1,010	730	1,740	355
Standard Computer Corp.	IC-4000	$ 9,000	9/68	4	0	4	X
	IC-6000	$ 16,000	5/67	3	0	3	X
	IC-7000	$ 17,000	6/69	7	0	7	X
Univac	I/II	$ 25,000	3/51	3	2	5	X
	III	$ 25,400	8/62	32	36	68	X
	SS-80/90	$ 8,000	8/58	17	20	37	X
	418-I/II	$ 13,700	6/63	72	65	137	X
	418-III	$ 23,600	7/69	44	55	99	10
	491/492	$ 27,000	12/61	16	12	28	X
	494	$ 47,000	2/66	53	45	98	X
	1004	$ 1,000	?/63	890	900	1,790	X
	1005	$ 1,630	4/66	660	200	860	X
	1050	$ 8,800	9/63	170	140	310	X
	1103/5	$ 35,000	12/50	0	3	3	X
	1106	$ 41,000	12/69	80	115	195	29
	1107	$ 57,000	10/62	6	13	19	X
	1108	$ 68,000	9/65	135	100	235	X
	1110	$ 79,000	6/72	19	29	48	18
	9200	$ 2,700	6/67	1,250	900	2,150	X
	9300	$ 4,600	9/67	905	875	1,780	X
	94/9480	$ 11,500	5/69	270	295	565	55
	9700	$ 21,600	8/72	11	17	28	X
	90/30	$ 8,200	2/75	–	–	–	NA
	90/60	$ 17,900	1/74	22	6	28	70
	90/70	$ 24,900	11/73	12	3	15	37
	Subtotals			4,667	3,831	8,498	219
	301	$ 6,600	10/60	150	7	157	X
	501	$ 16,100	6/59	9	0	9	X
	3301	$ 22,700	7/64	64	0	64	X
	Spectra 70/15	$ 4,000	9/65	11	0	11	X
	Spectra 70/25	$ 7,000	9/65	2	2	4	X
	Spectra 70/35	$ 11,800	1/67	91	5	96	X
	Spectra 70/45	$ 22,600	11/65	250	18	268	X
	Spectra 70/46	$ 37,400	11/68	31	2	33	X
	Spectra 70/55	$ 34,900	11/68	5	2	7	X
	Spectra 70/60	$ 40,500	9/70	18	0	18	X
	Spectra 70/61	$ 47,200	3/71	10	0	10	X
	Spectra 1600	$ 3,600	1/69	67	0	67	X
	Spectra 70/2	$ 11,500	7/71	108	0	108	X
	Spectra 70/3	$ 18,900	10/71	19	0	19	X
	Spectra 70/6	$ 29,300	10/71	45	0	45	X
	Spectra 70/7	$ 36,300	10/71	22	0	22	X
	Subtotals			902	36	938	X
	Totals			5,569	3,867	9,436	219
Xerox	Sigma-5	$ 11,500	8/67	265	60	325	X
	Sigma-6	$ 20,000	11/70	38	8	46	6
	Sigma-7	$ 24,000	12/66	100	25	125	X
	Sigma-8	$ 19,000	9/71	21	7	28	5
	Sigma-9	$ 44,000	11/71	39	8	47	9
	530	$ 3,500	8/73	135	25	160	95
	550	$ 7,525	11/74	–	–	–	NA
	560	$ 17,030	11/74	–	–	–	NA
	940	$ 24,000	4/66	58	5	63	X
	9300	$ 8,500	11/64	30	5	35	X
	Subtotals			686	143	829	115
TOTALS				62,358	45,047	107,405	13,668

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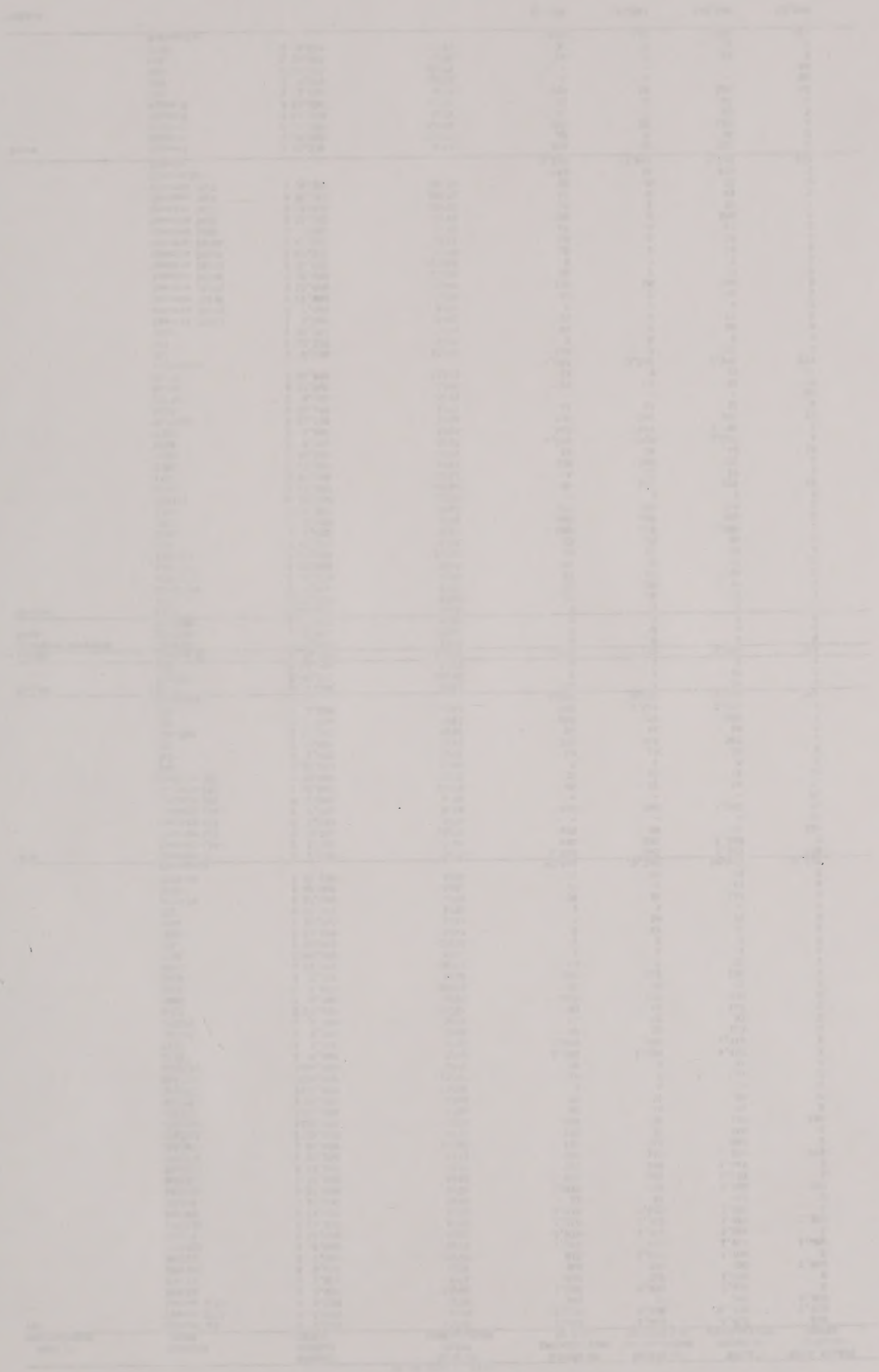

• A QUADRILLION BITS ON-LINE? Well, not quite. EDP/IR misplaced a few decimal points when it reported (EDP/IR Aug. 2,1974) that Precision Instrument's new Unicon 190 laser mass store can handle that much data from a single controller. Actual capacity is closer to one trillion bits, PI says. Smallest configurations start with the controller and one read/write unit storing 16,000 megabytes ($395,000 including interface) and can be expanded to 132,000 megabytes by adding read/write boxes. Average access time for seeks within a single 200 megabyte filmstrip is 200 milliseconds; or seven to ten seconds if the device must find and mount a new strip for reading.

• MA BELL TOOK PAINS TO INSIST SHE WASN'T CHANGING HER ANTI-INTERCONNECTION stand last week in an announcement that appeared to be making a major concession to interconnect vendors. AT&T said that henceforth, "authorized" telephone answering machines may be connected directly to the telephone network if they incorporate a "protective connecting module" designed by Bell Labs. Users will no longer have to pay a monthly charge to Bell to connect equipment not manufactured by AT&T.

The new "program," as Bell calls it, was apparently designed to head off a complaint before the FCC from an independent vendor, PhoneMate Inc., which objected to the interconnect fees. PhoneMate dropped its complaint in the wake of Bell's announcement and a company spokesman called it a "true victory for telephone users."

Bell insisted the protective module idea is only appropriate for answering devices, because they don't "originate" calls. But the company didn't explain why the scheme wouldn't work as well for interconnect terminals and other equipment. AT&T has consistently argued against any plan to "certify" interconnect equipment from independent vendors -- calling certification impractical -- but now that the term "authorized unit" has entered Ma Bell's vocabulary, can "certified units" be far behind?

• AS FOR THE RUMOR FROM JAPAN ABOUT A DEAL between Honeywell Information Systems(HIS) and a Japanese computer manufacturer , spokesmen for the US mainframer say it just isn't so. The denial came after announcement by Nippon Electric Company (NEC) that it has reached a "basic agreement" with HIS which would have the US company buying its small NEAC System 100 computer for injection with HIS software and marketing to the US and other countries for OEM use. The yearling computer has been a fair hit in the Japanese domestic market since NEC introduced it in 1973, and its maker claims that -- via Honeywell -- it should be shipping several thousand across the deep blue Pacific every year. The question now is this. Did NEC make a mistake, is Honeywell keeping something under wraps, or is such cross-communication just a fact of life in the international scene?

• MEANWHILE IN THE SAME OCEAN -- only a little to the south -- Honeywell has found a new user for its Series 6000 dual Model 6080 computer system. The Australian post office hopes to anchor a new post office telecommunications network around it. The plan is for the $5.6 million machine to evolve -- over the next twelve years -- into a vast $43 million web. The immediate focus will be on the installation of computers in Melbourne and Sydney along with associated communications and data handling processors in other state capital cities. Each main processor will have a full complement of peripherals and DATANET front enders. The first Model 6080 -- the post office's initial commitment -- is scheduled for "down-under" installation in Melbourne in 1975.

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INTERNATIONAL DATA CORP.
AUG 16 1974
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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 15, 1974 • VOL.9,NO.22 P.J.McGOVERN,PUBLISHER

Users look ahead

370 SHIPMENTS WILL PEAK THIS YEAR AS 360 REGISTERS SHARPEST DECLINE; MIGRATION OF IBM USERS HAS PASSED ITS MIDPOINT

The year 1974 will mark a turning point in the steady -- and carefully orchestrated -- migration of 360 users to the 370 family, according to a new survey of IBM users by International Data Corp., publisher of EDP/IR. The high water mark in the flood of 370s pouring out of IBM plants (2,500 Model 115s and 25s alone) will be balanced by the highest rate of 360 retirements ever . . . as users turn en masse toward teleprocessing . . . data base management in virtual storage environments . . . or simply decide they're ready to make the change that means more power for less money.

By yearend 1975, on the other hand, most of the shouting will be over -- at least for this round. The shrinking of the "rock bottom" base of owned and leased 360s will taper off and 370 users will be contentedly enhancing their systems while the Giant prepares for the birth of a fundamentally new generation.

Following up its 1972 study of 360/370 migration with a wide-ranging survey of nearly a thousand 360 and 370 users -- and factoring in revised census estimates based on internal IBM documents released during the Telex trial -- IDC reached a number of broad conclusions from its research earlier this year:

- The combined installed base of 360/370s will expand by 11% this year (measured in purchase price dollars) but grow only 7% or 8% in 1975 as the 370 family passes middle age. This year the number of 370s will finally surpass the population achieved by the ubiquitous 360.

- In the wake of IBM's belated blessing on distributed processing, migration paths have swerved from straightline sidegrading toward an emphasis on very large and very small CPUs (host computers surrounded by satellite and remote processors).

- Third-party lessors are facing the prospect of accelerated 360 returns from an ever-shrinking base of users, plus some severe headaches in leasing 370s: users looking for short-term leases in a lean and skittish money market.

- Users are looking a lot more carefully at their EDP needs, keeping watchful eyes on the future . . . planning acquisitions carefully.

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Though perhaps not as turbulently as before, the 360/370 installed base continues to churn away, governed both by product lifecycles and the looming economic thunderheads that are making everyone wary. For a monolith threatened with an antitrust breakup, IBM seems to be fine shape -- and thoroughly in control -- as it spins users through generations and half-generations at a far faster clip than its slower-moving competitors.

At yearend 1973, systems in the 360 and 370 families accounted for more than half the value of all general purpose computer systems installed in the U.S. (53% of $27.3 billion); there is little reason to think these systems will lose any of their overwhelming dominance until the late 1970s -- when user migrations to IBM's Future Systems will probably bring a repeat of the patterns in greater volumes.

The big push is over

The bulk of the transition from 360 to 370 is past, IDC's studies indicate. The users most likely to migrate -- those renting 360s -- have already taken wing. Just three years ago, in fact, there were more than twice as many 360s installed as there are today. Among all the 360/370 users IDC surveyed, less than a third planned to migrate or upgrade during 1974, and only one in ten planned to change systems in 1975.

Nevertheless, 1974 will be a key year for this customer population. Putting some numbers on the important trends:

- This year will show the greatest deterioration in the population of 360s — a 30% drop -- and the remaining rental base will be cut by fully half. Smaller models will see especially heavy attrition. From 1975 on, however, the 360 base will shrink more slowly.

- On the other hand, the average value of the surviving 360 systems will increase steadily as users who hang on enhance their memories and add peripherals. Thus the overall value of the 360 base is declining much more slowly.

- On the 370 side of the coin, shipments will climb 35% this year over 1973 -- both in numbers and dollars -- with massive early shipments of Models 115 and 125 accounting for most of the numbers and volume deliveries of 158s and 168s pulling in most of the dollars. By number, IBM will rent four times as many systems as it sells.

- One third of the third-party leases on 360s will expire this year (85% by 1976!) and virtually all the leases written on 360s during 1974 will run no longer than four years.

- With money tight, interest rates soaring and the obsolescence of current systems already on the horizon, many prospective migrators would like to acquire 370s on short-term third-party leases. But the leasing companies are facing exactly the same problems -- and many are already thinking they'd rather finance a sand castle than a 370. Thus, rental will remain the most common method of acquisition.

From the looks of things, "wait and see" will soon become the prevailing adage around IBM computing rooms as the unveiling of FS approaches and the alternatives to acquisition become more attractive -- adding peripherals, enhancing

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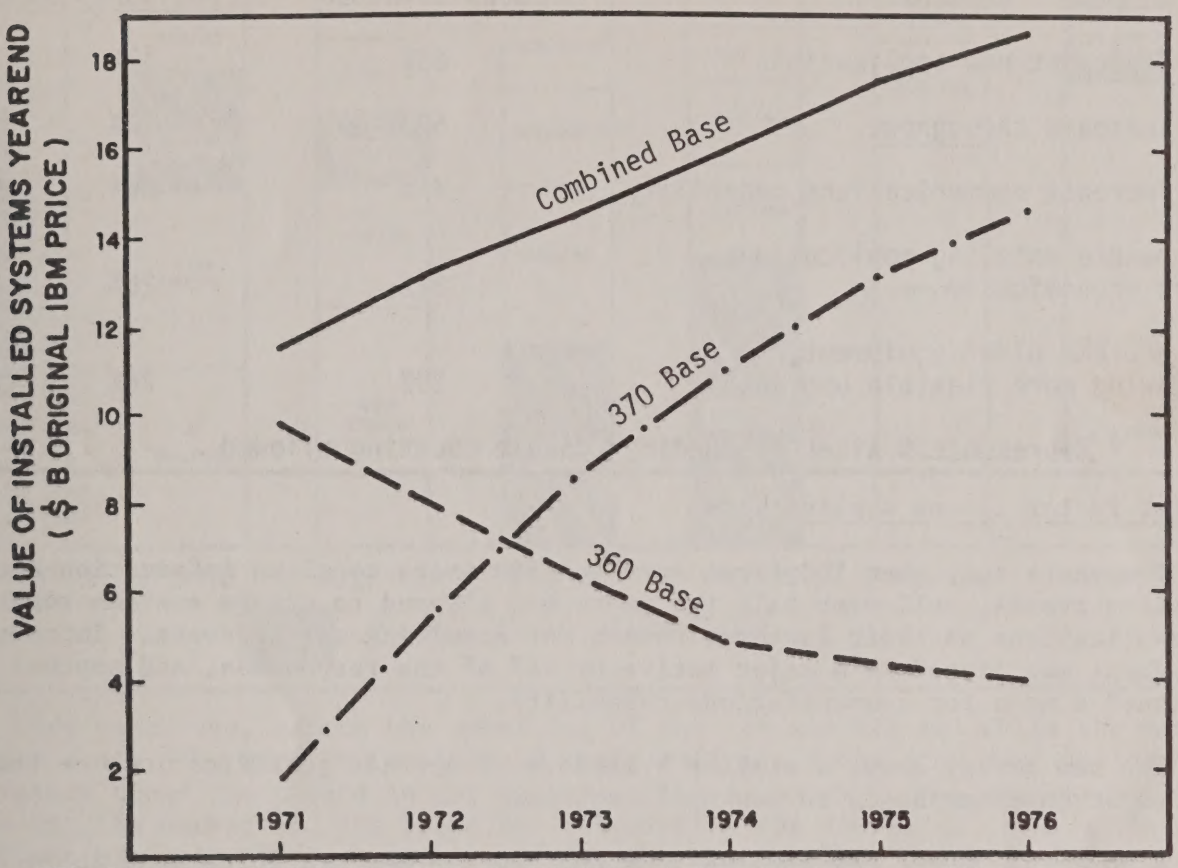

NET 360/370 BASE SHOWS STEADY GROWTH -- The chart above illustrates graphically the uninterrupted expansion of the overall IBM 360/370 installed base from 1971 to the present, and projected through 1976. High volume 370 shipments picked up the baton from the faltering 360 base with ease and should reach a peak installed value of $14.6 billion by YE76.

operating systems, buying outside services. As migration tails off, most of the action will center around small systems (360s going, 370s coming) and the big virtual storage 158s and 168s.

Corollary to the "settling down" of the migration is the question of what to do with all those left over 360s. IDC's study indicates that as many as 300 leased 360s may be orphaned and homeless by the end of this year. And owners planning upgrades will be competing with the leasing companies to find customers in the recycled computer market. All this undoubtedly spells further erosion of 360 prices -- not a great problem for owners who think of their used computers simply as old equipment, but a hardship for third party lessors who have no other assets.

Indications are the market for used 360 CPUs is holding up well as long as the prices are right, so the huge reservoir of computing power represented by the remaining 360 base probably won't go entirely to waste. Aggressive marketing seems to be the key to re-leasing 360s. But some leasing companies admit that finding new homes for obsolete 360 peripheral equipment is a bigger problem -- and quite a few aging printers, disks and tape drives are already gathering dust in lessors' warehouses these days.

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WHY MIGRATE? -- WHAT USERS SAY

Reasons	Primary * Consideration	Secondary * Consideration
To implement new applications	66%	17%
To increase throughput	64%	17%
To increase communications capability	41%	26%
To handle existing applications more economically	32%	26%
To replace older equipment, allowing more flexible upgrades	29%	26%

* Represents % sites responding; double counting allowed

Biggest factor is new applications

Two years ago, when IDC first surveyed IBM users to glean information about migration trends, well over half the users who planned to change systems reported new applications as their foremost reason for acquiring new hardware. Improved throughput was listed as a major motive by 44% of the respondees, and another 35% mentioned a need for communications capability.

The new survey shows a similar breakdown of upgrade justifications -- but with an even stronger emphasis on new applications:

- More than ever, new applications and new systems are going hand in glove. Clearly, when the time comes to add new or more elaborate DP applications, users start shopping for new equipment.

- Concern about throughput in these belt-tightening days mirrors the ever-increasing workloads at DP installations and the determination to get as much "bang for the buck" as possible. Many installations are working close to capacity -- only 16% of the computers covered in the survey were in use one shift or less, and nearly half were running two shifts or more.

- Greater numbers of users are upgrading with better communications uppermost in mind, reflecting the rapidly widening interest in source data capture, on-line inquiry and transaction processing.

Hopping into the "saddle"

Growing more pronounced is the "saddle effect" -- a simultaneous trend to bigger and smaller CPUs. Central processors grow steadily more powerful and cheaper, and users are taking advantage of the economies of large, centralized processors. But "feeding" these data-hungry hosts effectively means surrounding them with remote and small front-end processors designed to pre-process messages and data and to direct huge volumes of communications traffic. Small computers at remote sites may be used both as stand-alone machines and remote terminals; traditional terminals meanwhile are evolving into processors in their own right.

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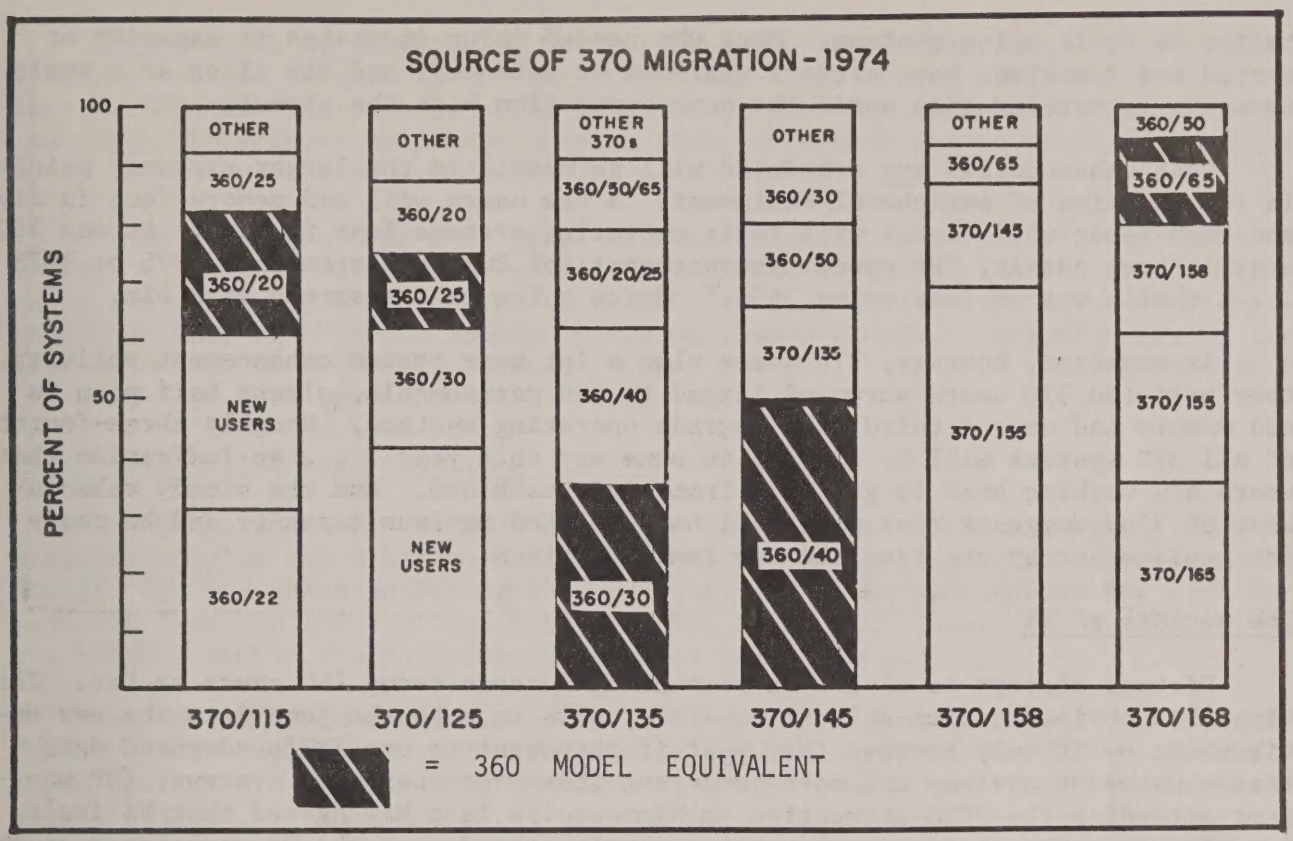

Two years ago, before the unveiling of the 115 and 125 and while the early, larger scale 370s were at the peak of their delivery cycle, the most noticeable migratory trend was toward larger systems. Today, however, the smaller machines have hit the market and the trend has reversed: 360s are being replaced in general, not by their 370 equivalents, but by the next smaller model -- perhaps because users who don't need big increases in throughput are discovering they can get more power and memory from less expensive 370 systems. Meanwhile, many small 360 users are joining the stampede toward System/3.

Moving within the family

Movement is also going on within the 370 family, both up and down. While most of the changes, predictably, involve users who are upgrading from 155s and 165s to the new virtual storage 158s and 168s (since IBM has priced field upgrades of these older models "rather high"), some medium-scale users economize by moving to smaller new 370s (with their expanded memories). But virtually none even contemplate backtracking to used 360s, despite rock-bottom prices; software is upward compatible, but 370 programs don't adapt easily to 360s.

The table above shows, by percentage, where the users of each 370 model are coming from. Note that the great majority of 370/158s and 168s are replacing older or smaller 370s -- and generally systems that lack virtual storage.

What about the stay-at-homes?

As pointed out above, the most volatile part of the 360 base has already evaporated. But what's going on among the slower-moving users left behind? According to those responding to the IDC survey, many of the remaining 360 users have decided to by-pass an upgrade to 370 and wait for FS -- meanwhile sticking to the

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basics on their aging systems. Most who needed major increases in capacity or wanted new functions have already upgraded or enhanced, and the class as a whole seems to be marking time until the next generation hits the street.

What enhancements are scheduled will go mostly to the larger systems, mainly in the addition of peripheral equipment. A few users will add memory (one in five) and even fewer will tinker with their operating systems (one in ten). As one 360 stay-at-home put it, "We expect announcement [of Future Systems] in 1975 or 1976 . . . that's why we keep using 360s." Quite a few others agreed with him.

As expected, however, 370 users plan a lot more system enhancement activity. Over half the 370 users surveyed intend to add peripherals, almost half plan to add memory and over a third will upgrade operating systems. Roughly three-fourths of all 370 systems will be altered in some way this year . . . an indication that users are working hard to get more from their machines. And the steady enhancement of 370s suggests that many will have reached maximum capacity and be ready for replacement by the time the new family arrives.

The success of VS

Virtual storage is clearly a resounding success among IBM users so far. The Giant has obviously been able to convince users to make the jump into the new environment -- if only because they must if they want to use IBM's advanced data base management systems and more-ponderous-than-ever operating systems. (DP managers attending the DPMA convention in Minneapolis last May agreed that VS isn't exactly manna from heaven -- but not a single attendee at the VS workshops, on the other hand, voiced a serious complaint .)

The table below compares the percentage of systems by model to be using virtual storage at yearend 1974 against the figures for yearend 1973:

Percent of Installed Systems with Virtual Storage Capability

	370/125	370/135	370/145	370/155	370/158	370/165	370/168
12/73:	87%	24%	16%	-	50%	-	NA
12/74:	90%	52%	65%	10%	64%	29%	38%

An innate concern about obsolescence is embedded in the migratory instincts of IBM users. In addition to the cost of new or replacement equipment, a computer user has to worry, for instance, about site preparation and conversion costs -- an amount often equal to the value of the hardware. Since computer obsolescence has more to do with advancing technology than with equipment wear and tear -- and often more to do with marketing strategy than technology -- worrying about obsolescence becomes an exercise in thinking like IBM.

Peeking in the Telex window

Observers who banked on a five-to-six-year IBM product cycle found their expectations vindicated by the planning documents uncovered during the Telex litigation. Despite indications that IBM has been forced to push back the announcement of the first FS family members by at least a year -- or at least has found it expedient to do so -- the new generation should be upon us within two years. And the IDC survey indicates that users are very much aware of that fact.

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They mean to be prepared -- and not be lured into a marriage with a system they may want to divorce in a relatively short time. Users who planned to buy or lease a 360 this year are counting on a useful lifespan of only two or three years, and those who already have them tend to view their machines as temporary bridges to an FS system or a marked-down 370.

Those acquiring 370s this year, however, planned to keep their equipment an average of four or five years -- well into the early years of FS. Some of these users say they're not interested in trailblazing or guinea-pigging new systems anyway -- they're happy to follow in the well-worn tracks of the pioneers as they take advantage of new developments. Leased and purchased 370s tend to be slated for long-term use, sometimes up to eight years.

FS -- more of the same migration?

The macro trends in 360/370 migration have become so clear that it's a simple exercise to plot the total movement from 370 to FS . . . assuming history repeats itself. So the question facing industry analysts -- at least those who care to look out into the 1980s -- is whether or not there can be anything except more of the same at double the dollar volumes a few years hence.

Several unknowns cloud the issue. First, there is antitrust . . . Question Number One in anybody's book! The Justice Department trial is now expected to begin against IBM shortly after Christmas, and it could run a year before there's even a ruling . . . and the first appeals are filed. One school of thought (and EDP/IR is subscribing to it more and more -- see the Dec.31,1973 issue) is that IBM will bite the bullet and propose voluntary divestiture to its stockholders long before the courts grind out an imposed solution. Its recent beefing up of the General Systems Division can be read as a move in this direction.

Whether such a move would really change the dynamics of the computer industry is, of course, subject to question. In all the recent testimony before the Hart Committee (EDP/IR Aug.2,1974), no one ventured an answer. Most of the witnesses seemed to think, however, that some sort of split is necessary.

Or will there be major differences?

What about IBM's fairly clearly stated plans for the introduction of a massive new operating system -- "System Q" -- as a prelude to any Future System (EDP/IR Jan.16,1974)? "Broader usability is the dominant theme of IBM's software planning for the next decade," EDP/IR stated in its analysis eight months ago. Since that time, the message has been coming in louder and louder -- users want transparency.

The true excitement -- indeed the fulfillment of the promise -- of the computer lies in the years ahead. Mainframes themselves will become network oriented (or actual networks) with special and general-purpose processors hung on to vast memories . . . evolving into systems that give answers instead of serving as playthings for computer buffs. Users will want to concentrate on data base management, autotransaction applications, real-time commerce -- and not on recoding applications to fit any mainframer's whim.

The important needs will be reliability, security, transferability within networks. Communications may become the great equalizer -- possibly advancing to the point where users can choose mainframes on whim -- as consumers pick cars today -- instead of following a forced migration path. It could happen!

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• WORD FROM THE OLD COUNTRY is that Unidata, that two-year old European computer-making combine of CSII, Philips, and Siemens, has recently gathered still another manufacturer to its bosom -- Germany's Telefunken Computer. But rumors that the perennially ailing maker of the large scale TR4 and TR440 computer systems would come in as full partner proved ungrounded as Siemens picked up the entire (DM20 million) share-capital tab from Telefunken's joint parents, Nixdorf and AEG-Telefunken. Siemens new subsidiary will be christened Computergeselleschaft Konstanz.

Reasons for the takeover were not immediately clear considering that just two years ago Siemens balked at a chance to become one of Telefunken's founding fathers, despite guarantees of substantial government development aid. Instead, Nixdorf, a commercially-oriented accounting machine manufacturer stepped in, and since then the struggling Telefunken has had its share of marketing headaches.

Though the more cynical onlookers jibe that the acquisition will do little to alter Telefunken's shakey standing, nevertheless proud parent Siemens will now have the means to fill out the upper register of its computer systems scale, and Unidata will have expanded its customer base . . . and its somewhat unruly product line.

Nixdorf, on the other hand, could be left out in the computing cold as government money and business -- once directed towards its former subsidiary -- drift away, and Unidata's Philips Data Systems, a competitor of Nixdorf's, takes over the accounting machine end of the business. But it's more likely that Nixdorf merely wants out of the big-machine racket and a chance to shift its emphasis elsewhere . . . or find that merger it's been talking about for a long time . . . in which case the acquisition of Telefunken by Siemens leaves it attractively unencumbered.

• SINGER IS BUILDING UP ITS LINE OF SYSTEM 10 business computers, setting its sights on the lucrative, fast-growing market for turnkey small business systems. Four new members of the System 10 line were introduced just this month -- Models 110-1, 3, 4, and 5. Each system, according to Singer, supplies a "complete turnkey solution" to certain commercial application problems at varying work volumes. A "unique hardware orientation," Singer claims, "does away with the need for a complex operating system" -- leaving the processor and memory spaces freer to handle the packaged applications that come with the systems.

Priced from $25,000 to $450,000, the new System 10s are aimed specifically at users in the wholesale and distribution industries -- where Singer got a head start in point-of-sale. But the company also has its eye on the vast numbers of other small-to-medium sized firms that will be turning to computers in the next four or five years.

• "WRITING ONE-TO-THREE YEAR OPERATING LEASES ON 370s is a precarious business these days," the president of Itel Data Processing Group told EDP/IR last spring. Richard Lussier was explaining why Itel had turned to packaging full-payout leases on 370s after taking a loss on its huge 360 portfolio. But now, Itel is back to writing short-term leases -- apparently because the Internal Revenue Service has ruled it may not take a big tax break on depreciation if a lease runs longer than three and a half years.

But Itel doesn't seem discouraged -- it is going ahead with the formation of a second Computer Investors Group (with an equity of $15 million from shareholders plus $35 in borrowed capital) that's designed to give high-bracket executives a tax sheltered investment.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 28,1974 • VOL.9,NO.23 P.J.McGOVERN,PUBLISHER

The microscope

MICRO VERSUS THE MINI . . . IS THERE A CONTEST?
MINI SHIPMENTS NOT THREATENED AS MICROPROCESSORS STAKE OUT NEW TERRITORY

Microprocessors are in. Nobody's quite sure of the numbers, but everybody sees nearly an exponential growth curve for the tiny technological prodigy . . . say from $50 million shipped this year to $800 million by 1980. And with low-cost 8 and 12 bit processors a reality -- and 16 bit manipulators sure to be so in a few months -- there's a natural concern in minicomputer circles. What will the shape of that growth curve do to the shape of the mini market?

Not much, it seems. For all the companies now running in the micro race -- from the big semiconductor house Texas Instruments and microprocessor pioneer Intel to the minicomputer leader DEC -- upcoming shipments of minicomputers should be little affected by the proliferating micros. Instead, the "processor-on-a-chip" seems to be angling primarily into areas new to computerized control . . . tapping user fields out of reach of the minicomputer makers.

As one microprocessor engineer put it, "You aren't going to find people unbolting a mini to put in a microprocessor." Rather, as one of his industry counterparts felt, there will be a "merging with the minicomputer business." EDP/IR and analysts at International Data Corporation (IDC), our publisher, agree. IDC's in-depth probing of the microprocessor revolution and the semiconductor industry shows that:

- 1974 shipments of general-purpose computational type minis -- about half of those going out -- will hardly be impacted at all. These are high "value-added" items which go mostly to end users with little inclination to fiddle with bare-bones microprocessors.

- The remaining minicomputers are more susceptible to "bumping" by their petite cousins, but still only to the tune of $30 to $45 million (10 % to 15% of a $300 million crop) at most, nil at least.

- Microprocessors seem to be thriving in the exploration of new applications . . . especially industrial control, data entry devices, modems, and anywhere else it's cheaper to use a microprocessor than a general-purpose mini. The future could find micros in such diverse places as in the home washing machine, on the electronic football field, or even someday under the hood of the family car.

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The impact of microprocessors on the mini market is cushioned even further by the fact that some of the expected $50 million worth of microprocessors to be shipped this year will go right to the receiving docks of the mini makers themselves . . . to re-emerge as microcomputers under a new label. Such products as DEC's modular MPS system based on an Intel 8008 processor chip and General Automation's LSI 12/16 and LSI 16/25 microcomputers built around Rockwell's exotic silicon-on-sapphire chip just go to show the mini makers' "if you can't beat 'em, join 'em" adaptability.

The micro buyer's dilemma

Three years ago, riding on the crest of the MOS-LSI technological wave, Intel introduced the first microprocessor . . . the 4 bit 4004 processor on a single .11"x.15" silicon chip. Now, only three years later, microprocessors are into what at least one manufacturer claims is their third generation. For users looking for low-priced manufacturing controls with a dab of logic, or terminal builders hoping to raise the IQ of their product, the microprocessor comes as the answer to a past history of hardwiring ICs, customizing MOS-LSI chips, or doing without.

But now users are faced with a different problem. The panoply of products available is so varied -- in data word size, type of semiconductor technology, level of compatibility for integration into his own product, and price -- that choosing can be a juggling act that involves the user's needs, his in-house expertise with software and hardware, time factors, and foresight into an industry future where the visibility range can sometimes be less than lead times.

For example, a quantity user can take a bare-bone 8008 microprocessor from Intel ($60), add a 2K bit programmable Read Only Memory (ROM) priced at $40, hook up 32 1K bit Random Access Memories (RAM) at about $11 each, and incorporate the whole $440 worth of chips into his product. Or he can lay out $3540 for the Intellec 8 microcomputer system . . . Intel's tabletop total system rendition of the same 8008 chip and comparable memory but with I/O module, power supply, software, chassis, interfacing, etc. And, the actual optimum trade-off point between component costs and user development/interfacing costs may lie somewhere between the "raw" chip and total system levels.

The question, of course, is how much the user wants to get involved with the nitty-gritty of putting his microprocessor to work. Is he capable -- or does he even want the hassle -- of developing control logic, microprogramming, designing interface circuitry, and writing system software or not? Can he afford development time?

Many users can't. And here -- at the systems level -- the mini makers may prove to have an advantage since they are more conversant with end-user problems, understand the systems market, and are somewhat more applications-oriented than most basic chip suppliers. Those chip makers hoping to "end-around" the systems-oriented firms into the low-end mini market are adjusting to the trend . . . by coming up with their own systems and software/testing support like Intel and National Semiconductor, or, like Rockwell, at least systems-orienting their new-generation chips with more micro-instructions, I/O LSI controllers, and interfacing features. So they're working on it, but how much their efforts will woo minicomputer prospects into microcomputer showrooms -- as opposed to supporting that growth curve with marketing targets not really in the mini makers' sights -- remains to be seen.

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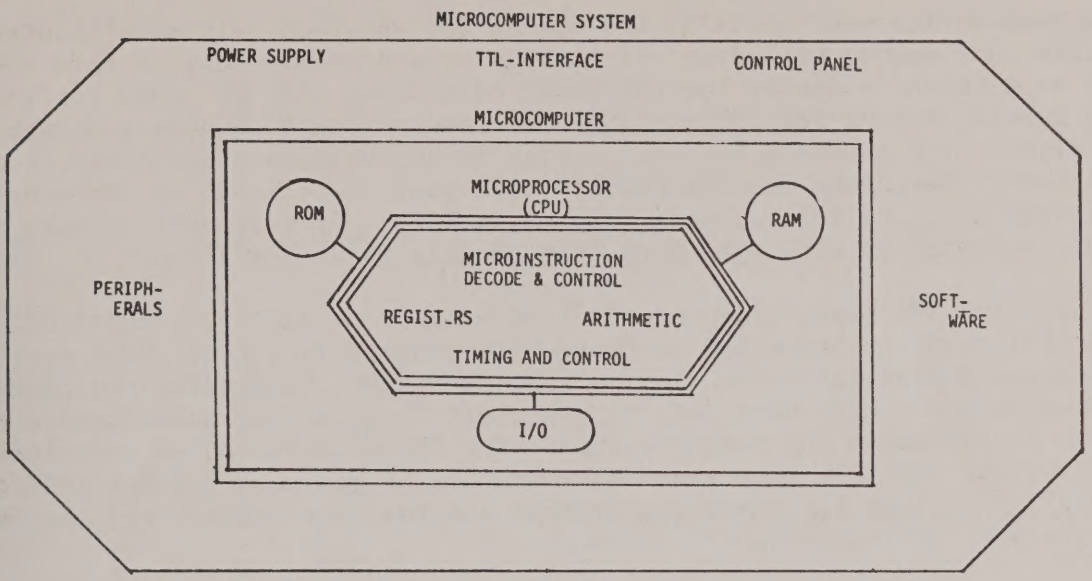
CONSTRUCTION OF A MICROCOMPUTER SYSTEM



Note that each level -- CPU to Computer to System -- requires certain interface circuits, different micro/software system programming levels, and "value-added" to the basic processor.

Investment in technology . . . and shifting product lines

Much of the future success of the chip makers lies in the outcome of the technological race now underway, and two of the more innovative bettors are:

+ Rockwell/General Automation with their jointly developed silicon-on-sapphire chip. The advantage of using sapphire is that it allows for much faster cycle times; the disadvantage is that it's a process still not well understood.

+ RCA is combining the two standard chip technologies -- which provide different electrical charges on the silicone substrate -- into one, hoping to have a chip in production early in 1975. The hybrid will take less power than conventional chips and work well in a hot, noisy environment.

Intel, who claims to have sewn up about three fourths of the chip market, illustrates that the rewards for innovation can be substantial. But marketing state-of-the-art products has its hazards, too: choosing the right technology early, insuring compatibility of follow-on products, and keeping up with the market without eating into your own customer base with a new product.

As for the minicomputer manufacturers, if their current shipments won't be affected by the microprocessor revolution, at least the prices and eventual look of their product lines will. Like DEC and GA they can choose to co-opt the technology for their own uses, or, like Hewlett Packard they can ignore it and focus on the lower end of mainframer markets. But when the 16 bit "processor-on-a-chip" hits the street in a year or two (and after that the 32 bit machine) then look for a radical change in product architecture, if not a rearrangement of the industry hierarchy.

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HARD TIMES ARE FORECAST FOR INDEPENDENT MEMORY MANUFACTURERS

After a land-office year in 1973, the market for independently manufactured IBM compatible core memory will drop off sharply -- and permanently -- this year, according to a recent study by International Data Corp. And at least for the immediate future, demand for 370 semiconductor memory won't be nearly enough to pick up the slack. IDC analysts forecast a drop in add-on memory shipments from independent memory suppliers to $280 million this year (calculated at IBM equivalent prices) from the $400 million peak reached in 1973. By next year, annual shipments are expected to sink even more dramatically to $160 million.

Within the 360 base, independents have managed to capture a third of the total 1.4 billion bytes installed on these core storage machines. Many systems have been enlarged beyond the normal limits imposed by IBM, indicating the plug-compatible manufacturers have been able to use their lower prices and extended memory offerings to stimulate the memory market. The first announced -- and already obsolete 370/155s and 165s were also major sources of business for the independents during 1973. Add-ons for these two systems and the large 360/50 and 65s have generated the bulk of independents' revenues.

But the era of core -- at least for large scale computer memories -- is over. Users of 360s and 370/155 or 165 who've decided to weather the virtual storage generation without changing mainframes will keep buying additional core for another year or two; but the steadily shrinking buyer base, stiff competition and the uncertain future for this market will make the core memory business unpromising even for the most enterprising independents.

On the other hand, the IDC study indicates, the total number of bytes and dollar value of independent core memory on IBM systems will stay fairly stable through 1976. Rapid retirement of these systems -- installed 360s are expected to drop to half their current number by then -- will be balanced by steady increases in the average bytes installed on the surviving machines.

The 370 question

Whether the independents can make a bonanza out of the 370 base remains in serious question. But it seems clear that this market won't be as profitable as the core business -- and won't heat up in time to bridge the generation gap without a drastic falloff. Models in the 370 line come bundled with much more memory than their 360 predecessors, and IBM has priced its own add-on boxes much more competitively this time around.

The main hope of the independents for the long run seems to be the 370/145. Nearly 3,000 of these are now in the field and virtual storage users seem to be discovering they need more, rather than less main memory to handle VS environments efficiently. As IBM itself expressed it in a press release announcing that 145 memory limits have been doubled, "increased storage capacity may improve virtual storage processing efficiency by allowing users to keep more critical data ready for processing in main memory." And by putting its imprimatur on expanded 145 memory, IBM may make life easier for plug-compatible salesmen.

Several independents have announced add-on semiconductor boxes for 370 models and typically claim to offer savings ranging from slight to significant -- 10% to 40% for Cambridge Memories STOR 145 boxes, for instance. In most cases, the independents also claim to offer completely "transparent" devices that in no way

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THE INDEPENDENT MEMORY SUPPLIERS AT YEAREND 1973
(Values calculated at IBM list prices for equivalent memory)

	Megabytes on 360s	$M	Megabytes on 370s	$M	Total megabytes	Total $M
AMS	41.5	60.9	170.5	86.1	212.0	147.0
Fabritek	58.6	82.4	-	-	58.6	82.4
Data Recall	43.4	52.2	38.9	19.6	82.3	71.8
Cambridge	7.0	13.1	160.4	80.8	167.4	93.9
EM&M	26.5	39.7	61.7	31.1	88.2	70.8
Others	250.0	206.7	46.5	23.4	304.2	230.1
Subtotal	435.0	455.0	478.0	241.0	913.0	696.0
IBM	920.0	1,420.0	2,692.0	1,464.0	3,612.0	2,884.0
TOTAL	1,355.0	1,875.0	3,170.0	1,705.0	4,525.0	3,580.0

interfere with the CPU circuitry and can be electrically isolated from the rest of the system for IBM maintenance work. IBM, after putting up some resistance, yielded to pressure from users to agree to maintain computers with independent memory attached -- though recently it warned 135 users by letter that attachments cannot be made to that model without circuitry changes. IBM management later repudiated the warning.

Nevertheless, users couldn't help getting the message: IBM looks upon plug-compatible memory with no more fondness than it feels for other independent attachments and might seize an opportunity to make life uncomfortable for users who acquire it. Since IBM prices are down anyway -- and dealing with multiple vendors can be complicated -- users may simply decide not to bother with independents.

The outlook for memory

Analysis of the IDC data file indicates a number of general trends in memory use and in the memory market. Combined with responses to a survey of IBM users, the figures show:

- Independents can stimulate the use of larger memories by active marketing aimed at specific IBM models. The average memory size of systems in which the independents have shown the most interest has grown faster than other systems, indicating that lower prices can persuade buyers to acquire more memory than they'll buy at IBM prices.

- As many 370s reach the end of their life cycles in 1976, many users will have reached the maximum memory capacities of their systems and be ready to move onward to the next IBM generation. Among the remaining users, those with 145s will constitute the largest single market for add-ons. Across the board, the average memory size is expected to increase every year on every model.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF JULY 1, 1974

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	B-200 Series	$ 5,600	11/61	95	71	166	X
	B-300 Series	$ 5,200	7/65	355	70	425	X
	B-500	$ 6,000	11/68	450	440	890	X
	B-705/711	$ 1,300	3/73	170	90	260	160
	B-1712	$ 1,950	8/72	175	75	250	110
	B-1714	$ 2,200	8/72	275	150	425	175
	B-1726	$ 5,300	2/73	185	45	230	130
	B-1728	$ 7,700	8/73	50	20	70	70
	B-2500	$ 8,200	2/67	220	130	350	X
	B-2700	$ 8,700	8/72	125	85	210	85
	B-3500	$ 14,700	5/67	600	335	935	X
	B-3700	$ 20,000	11/72	55	18	73	35
	B-45/4700	$ 27,000	10/71	135	90	225	63
	B-5500	$ 35,000	3/63	85	30	115	X
	B-5700	$ 29,500	12/70	21	6	27	6
	B-65/6700	$ 50,000	11/69	73	58	131	14
	B-7700	$120,000	8/73	7	2	9	11
	Subtotals			3,076	1,715	4,791	859
Control Data Corp.	C-20	$ 19,600	4/61	3	5	8	X
	1604/A/B	$ 42,000	1/60	17	4	21	X
	31/3150	$ 9,000	12/64	85	49	134	X
	3170	$ 17,500	12/70	13	15	28	X
	3200	$ 14,700	5/64	47	44	91	X
	3300	$ 28,800	9/65	117	90	207	X
	3400	$ 23,700	11/64	4	8	12	X
	3500	$ 26,000	1/69	10	17	27	X
	3600	$ 48,000	6/63	18	15	33	X
	3800	$ 53,000	12/65	19	3	22	X
	6200	$ 42,600	11/70	2	6	8	X
	Cyber-72	$ 48,400	10/71	21	37	58	11
	Cyber-172	$ 41,200	1/75	-	-	-	NA
	6400	$ 59,600	5/66	57	49	106	X
	Cyber-73	$ 52,100	3/72	9	30	39	8
	Cyber-173	$ 54,600	1/75	-	-	-	NA
	6500	$ 78,800	12/67	20	12	32	X
	6600	$105,300	8/64	60	30	90	X
	Cyber-74	$ 93,000	3/72	3	6	9	3
	Cyber-174	$ 67,500	1/75	-	-	-	NA
	Cyber-175	$ 84,000	1/75	-	-	-	NA
	6700	$107,000	7/70	3	0	3	X
	7600	$125,000	1/69	13	6	19	X
	Cyber-76	$125,000	3/72	2	3	5	2
	Star-100	$250,000	12/73	1	0	1	3
	Subtotals			524	429	953	27 +
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	16	8	24	X
	1040/1050	$ 13,300	10/67	176	70	246	18
	1055	$ 22,000	12/71	25	9	34	10
	1070/1077	$ 30,000	6/72	16	2	18	6
	Subtotals			233	89	322	34
Honeywell	Gamma-10	$ 2,500	7/64	0	990	990	X
	Gamma-30	$ 9,900	2/62	0	147	147	X
	G-5X Series	$ 1,550	1/66	660	3,000	3,660	200
	G-100 Series	$ 4,000	4/66	260	1,510	1,770	X
	G-200 Series	$ 13,700	4/61	187	53	240	X
	G-405/410	$ 9,000	2/68	18	8	26	X
	G-415/420	$ 14,000	5/64	130	188	318	X
	G-425/430	$ 17,000	6/64	37	100	137	X
	G-435/440	$ 22,000	9/65	94	48	142	X
	G-615	$ 55,000	6/69	4	22	26	X
	G-625	$ 65,000	4/65	2	3	5	X
	G-635	$ 80,000	5/65	44	18	62	X
	G-645	$120,000	7/66	2	1	3	X
	G-6025	$ 21,800	11/73	20	7	27	35
	G-6030/40	$ 33,000	6/71	80	110	190	31
	G-6050/60	$ 46,500	7/71	61	46	107	27
	G-6070/80	$ 61,500	7/71	31	13	44	11
	G-6180	$100,000	2/74	2	0	2	4
	G-Subtotals			1,632	6,264	7,896	308
	H-105	$ 2,500	11/71	580	130	710	130
	H-110	$ 2,600	9/68	145	170	315	X
	H-115	$ 5,300	3/70	850	385	1,235	95
	H-120	$ 4,600	1/66	350	165	515	X
	H-125	$ 7,900	12/67	75	300	375	X
	H-200	$ 6,400	3/64	450	225	675	X
	H-2020	$ 2,350	2/73	340	35	375	130
	H-2030	$ 5,050	1/73	60	9	69	24
	H-2040	$ 9,000	4/72	295	100	395	90
	H-1015	$ 12,500	4/71	110	60	170	17
	H-2050	$ 14,100	4/72	175	50	225	50
	H-12/1250	$ 12,000	2/66	300	155	455	X
	H-2015	$ 17,800	2/71	115	55	170	25
	H-2060	$ 18,500	4/72	78	14	92	21
	H-2200	$ 19,600	1/66	120	46	166	X
	H-2070	$ 23,000	5/72	53	7	60	14
	H-3200	$ 26,900	2/70	62	28	90	X
	H-4200	$ 31,000	9/68	27	5	32	X
	H-2088	$ 44,000	4/72	5	1	6	2
	H-8200	$ 73,000	2/69	22	4	26	X
	H-4/1400	$ 13,200	12/61	25	24	49	X
	H-800	$ 28,500	12/60	33	11	44	X
	H-1800	$ 46,000	7/64	7	4	11	X
	H-Subtotals			4,277	1,983	6,260	598
	HIS-Totals			5,909	8,247	14,156	906

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IBM	System 3/6	$ 1,700	12/70	2,800	1,615	4,415	840
	System 3/10	$ 2,480	1/70	15,135	6,560	21,695	2,410
	System 3/15	$ 4,550	3/74	325	35	360	1,300
	360/20	$ 3,600	12/65	3,000	4,650	7,650	X
	360/22	$ 5,800	7/71	950	310	1,260	X
	370/115	$ 6,650	4/74	300	200	500	1,800
	360/25	$ 7,500	10/68	625	1,075	1,700	X
	370/125	$ 9,800	6/73	1,245	660	1,905	1,400
	360/30	$ 11,000	6/65	2,875	2,310	5,185	X
	370/135	$ 16,225	5/72	2,510	1,315	3,825	1,300
	360/40	$ 19,400	6/65	1,375	1,625	3,000	X
	360/44	$ 14,200	7/66	63	81	144	X
	370/145	$ 27,800	7/71	1,830	930	2,760	700
	360/50	$ 32,100	8/65	625	525	1,150	X
	370/155	$ 53,350	2/71	915	550	1,465	X
	370/158	$ 59,200	5/73	400	125	525	675
	360/65	$ 68,000	11/65	450	215	665	X
	370/165	$ 95,000	6/71	170	76	246	X
	370/168	$110,200	7/73	100	20	120	180
	360/67	$112,000	6/66	40	14	54	X
	360/75	$ 94,000	1/66	32	15	47	X
	360/85	$141,000	10/69	5	4	9	X
	360/9X	$150,000	11/67	14	2	16	X
	370/195	$194,600	3/71	20	4	24	7
	1130	$ 2,300	2/66	2,600	1,850	4,450	X
	1401	$ 3,700	9/60	1,000	910	1,910	X
	1401-G	$ 2,300	5/64	80	33	113	X
	1401-H	$ 1,300	6/67	41	42	83	X
	1410	$ 17,000	11/61	93	54	147	X
	1440	$ 4,700	4/63	210	215	425	X
	1460	$ 9,800	10/63	53	38	91	X
	1620	$ 2,700	9/60	310	225	535	X
	7010	$ 26,000	10/63	13	7	20	X
	7030	$160,000	5/61	3	1	4	X
	704	$ 32,000	12/55	1	1	2	X
	7040	$ 25,000	6/63	9	15	24	X
	7044	$ 36,500	6/63	8	10	18	X
	705	$ 38,000	1/56	3	3	6	X
	7070-74	$ 27,000	3/60	98	35	133	X
	7080	$ 60,000	8/61	47	1	48	X
	7090-94	$ 70,500	8/60	68	10	78	X
	Subtotals			40,441	26,366	66,807	10,612
NCR	Century-50	$ 1,950	2/71	1,050	145	1,195	170
	Century-100	$ 2,980	9/68	980	880	1,860	X
	Century-101	$ 2,750	10/72	695	50	745	225
	Century-151	$ 3,500	2/75	-	-	-	NA
	Century-200	$ 7,900	9/69	685	365	1,050	55
	Century-201	$ 7,000	8/74	-	-	-	NA
	Century-251	$ 10,000	11/73	45	15	60	75
	Century-300	$ 20,000	2/72	32	19	51	16
	304	$ 10,000	1/60	5	0	5	X
	310	$ 1,000	5/61	13	10	23	X
	315	$ 5,000	5/62	320	265	585	X
	315-RMC	$ 11,800	9/65	54	44	98	X
	390	$ 800	5/61	245	155	400	X
	500	$ 1,100	10/65	740	1,510	2,250	X
	Subtotals			4,864	3,458	8,322	541
Philco	1000	$ 7,000	6/63	15	1	16	X
	210/211	$ 40,000	10/58	9	1	10	X
	212	$ 52,000	1/63	8	1	9	X
Singer	System 10	$ 2,500	10/70	1,010	730	1,740	355
Standard Computer Corp.	IC-4000	$ 9,000	9/68	4	0	4	X
	IC-6000	$ 16,000	5/67	3	0	3	X
	IC-7000	$ 17,000	6/69	7	0	7	X
Univac	I/II	$ 25,000	3/51	3	2	5	X
	III	$ 25,400	8/62	32	36	68	X
	SS-80/90	$ 8,000	8/58	17	20	37	X
	418-I/II	$ 13,700	6/63	72	65	137	X
	418-III	$ 23,600	7/69	44	55	99	10
	491/492	$ 27,000	12/61	16	12	28	X
	494	$ 47,000	2/66	53	45	98	X
	1004	$ 1,000	?/63	890	900	1,790	X
	1005	$ 1,630	4/66	660	200	860	X
	1050	$ 8,800	9/63	170	140	310	X
	1103/5	$ 35,000	12/50	0	3	3	X
	1106	$ 41,000	12/69	80	115	195	29
	1107	$ 57,000	10/62	6	13	19	X
	1108	$ 68,000	9/65	135	100	235	X
	1110	$ 79,000	6/72	19	29	48	18
	9200	$ 2,700	6/67	1,250	900	2,150	X
	9300	$ 4,600	9/67	905	875	1,780	X
	94/9480	$ 11,500	5/69	270	295	565	55
	9700	$ 21,600	8/72	11	17	28	X
	90/30	$ 8,200	2/75	-	-	-	NA
	90/60	$ 17,900	1/74	22	6	28	70
	90/70	$ 24,900	11/73	12	3	15	37
	Subtotals			4,667	3,831	8,498	219
	301	$ 6,600	10/60	150	7	157	X
	501	$ 16,100	6/59	9	0	9	X
	3301	$ 22,700	7/64	64	0	64	X
	Spectra 70/15	$ 4,000	9/65	11	0	11	X
	Spectra 70/25	$ 7,000	9/65	2	2	4	X
	Spectra 70/35	$ 11,800	1/67	91	5	96	X
	Spectra 70/45	$ 22,600	11/65	250	18	268	X
	Spectra 70/46	$ 37,400	11/68	31	2	33	X
	Spectra 70/55	$ 34,900	11/68	5	2	7	X
	Spectra 70/60	$ 40,500	9/70	18	0	18	X
	Spectra 70/61	$ 47,200	3/71	10	0	10	X
	Spectra 1600	$ 3,600	1/69	67	0	67	X
	Spectra 70/2	$ 11,500	7/71	108	0	108	X
	Spectra 70/3	$ 18,900	10/71	19	0	19	X
	Spectra 70/6	$ 29,300	10/71	45	0	45	X
	Spectra 70/7	$ 36,300	10/71	22	0	22	X
	Subtotals			902	36	938	X
	Totals			5,569	3,867	9,436	219
Xerox	Sigma-5	$ 11,500	8/67	265	60	325	X
	Sigma-6	$ 20,000	11/70	38	8	46	6
	Sigma-7	$ 24,000	12/66	100	25	125	X
	Sigma-8	$ 19,000	9/71	21	7	28	5
	Sigma-9	$ 44,000	11/71	39	8	47	9
	530	$ 3,500	8/73	135	25	160	95
	550	$ 7,525	11/74	-	-	-	NA
	560	$ 17,030	11/74	-	-	-	NA
	940	$ 24,000	4/66	58	5	63	X
	9300	$ 8,500	11/64	30	5	35	X
	Subtotals			686	143	829	115
TOTALS				62,358	45,047	107,405	13,668

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• A QUADRILLION BITS ON-LINE? Well, not quite. EDP/IR misplaced a few decimal points when it reported (EDP/IR Aug. 2,1974) that Precision Instrument's new Unicon 190 laser mass store can handle that much data from a single controller. Actual capacity is closer to one trillion bits, PI says. Smallest configurations start with the controller and one read/write unit storing 16,000 megabytes ($395,000 including interface) and can be expanded to 132,000 megabytes by adding read/write boxes. Average access time for seeks within a single 200 megabyte filmstrip is 200 milliseconds; or seven to ten seconds if the device must find and mount a new strip for reading.

• MA BELL TOOK PAINS TO INSIST SHE WASN'T CHANGING HER ANTI-INTERCONNECTION stand last week in an announcement that appeared to be making a major concession to interconnect vendors. AT&T said that henceforth, "authorized" telephone answering machines may be connected directly to the telephone network if they incorporate a "protective connecting module" designed by Bell Labs. Users will no longer have to pay a monthly charge to Bell to connect equipment not manufactured by AT&T.

The new "program," as Bell calls it, was apparently designed to head off a complaint before the FCC from an independent vendor, PhoneMate Inc., which objected to the interconnect fees. PhoneMate dropped its complaint in the wake of Bell's announcement and a company spokesman called it a "true victory for telephone users."

Bell insisted the protective module idea is only appropriate for answering devices, because they don't "originate" calls. But the company didn't explain why the scheme wouldn't work as well for interconnect terminals and other equipment. AT&T has consistently argued against any plan to "certify" interconnect equipment from independent vendors -- calling certification impractical -- but now that the term "authorized unit" has entered Ma Bell's vocabulary, can "certified units" be far behind?

• AS FOR THE RUMOR FROM JAPAN ABOUT A DEAL between Honeywell Information Systems(HIS) and a Japanese computer manufacturer , spokesmen for the US mainframer say it just isn't so. The denial came after announcement by Nippon Electric Company (NEC) that it has reached a "basic agreement" with HIS which would have the US company buying its small NEAC System 100 computer for injection with HIS software and marketing to the US and other countries for OEM use. The yearling computer has been a fair hit in the Japanese domestic market since NEC introduced it in 1973, and its maker claims that -- via Honeywell -- it should be shipping several thousand across the deep blue Pacific every year. The question now is this. Did NEC make a mistake, is Honeywell keeping something under wraps, or is such cross-communication just a fact of life in the international scene?

• MEANWHILE IN THE SAME OCEAN -- only a little to the south -- Honeywell has found a new user for its Series 6000 dual Model 6080 computer system. The Australian post office hopes to anchor a new post office telecommunications network around it. The plan is for the $5.6 million machine to evolve -- over the next twelve years -- into a vast $43 million web. The immediate focus will be on the installation of computers in Melbourne and Sydney along with associated communications and data handling processors in other state capital cities. Each main processor will have a full complement of peripherals and DATANET front enders. The first Model 6080 -- the post office's initial commitment -- is scheduled for "down-under" installation in Melbourne in 1975.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" SEPTEMBER 11,1974 • VOL.9,NO.24 P.J.McGOVERN,PUBLISHER

A new tangent for Inforex

INFOREX UNVEILS SYSTEM 5000
IT'S A TURN-KEY AUTOMATED FILING SYSTEM . . . ISN'T IT?

It's like coffee. It's been around for years, but now someone's come up with instant. -- Timothy Cronin, Chief Executive Officer, Inforex

Marching again to the tune of a different drummer . . . and using its expertise as the nation's leading maker of key-to-disk data entry devices . . . Inforex has come up with a new product -- and a new concept -- for the world of electronic record-keeping. With it the company hopes to find a market among those who have -- in the past -- either languished in the backwaters of the computer revolution or suffered from information flooding in the EDP room.

Billed as an automated filing system -- but with overtones of data base management and data entry capabilities -- the conglomeration of micro-mini processors, hard-wired logic, I/O devices, and triple-decker software was introduced in New York last week.

Dubbing it System 5000, Inforex hopes its new product will usher EDP's disadvantaged either in or out of the computing mainstream, depending on their individual needs.

"It's not exactly easy to explain what System 5000 is -- which makes it tough to market, of course -- but basically it's a function-oriented inquiry/response system utilizing a combination of hardware and software. As a matter of fact, we weren't too sure what to call it ourselves," admits Timothy Cronin, Chief Executive Officer and Chairman of the Board for Inforex.

If categorizing their product is a little difficult for the company, touting it isn't. "We think we've got something really new here. Something that will either be a modest success or *really* take off," says Cronin.

A single system 5000 is designed to store up to 140 files containing a total of one million average-size records -- which translates to 100 megabyte file storage capability. Depending on the application, Inforex sees System 5000 replacing any file whatever -- paper, tub, microfilm, tape -- just about as fast as data can be inputted. There is no user programming, anyone can learn to use the system within a day or so, and up to thirty-two terminals can be accessing the file at once, either directly or over telephone lines.

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With rental costs for the System 5000 running between $2000 and $8000 per month, depending on the number of terminals and amount of disk storage, the question of whether Inforex can lure unautomated file keepers into the System 5000 lair will only be answered over a period of time. More immediate success might be realized with current computer users who would like a chance to yank some of the more flotsam/jetsam files out of their EDP rooms and back to their respective departments.

And, it's more than likely that Inforex will be pitching the more sophisticated market -- those already committed to the computerized way of life and familiar with its customs -- first.

Which button do I push?

What Inforex feels is unique about the System 5000 is its immediate applicability to all kinds of record-keeping, its ease of operation, and its "instant up." Users don't have to spend vast amounts of money to ready a site for System 5000, nor do they have to go through long and costly periods of "growing pains," employee education, and all the other impedances to implementing a new information processing system.

What makes it tick is an interlacing combination of hardware and software, including the use of microprocessors to direct data flow and peripheral devices. At the heart of the control unit -- which also houses the power supply and one or two tape drives -- is a 16 bit 64K byte minicomputer built and designed by Inforex. The "mini" controls the operation of the overall system, including data transfer, searching, paging, and security.

Other significant features of the System 5000 are:

- Disk storage is provided with up to four 29 megabyte disk drives for file and software storage. A disk adapter -- or microprocessor -- performs record searching of either full or partial records and controls disk functions.

- Tape storage of different sizes, depending on user needs, is available for logging and file transfer functions and serves as a redundant recording medium for security and audit trail use.

- Terminals (up to 32 per system) are the basic I/O device. Again a microprocessor is used to perform editing functions and cursor positioning. A terminal consists of a typewriter with added function keys and a video display unit. A 30 character-per-second printer can also be used as an output device.

- To insure system compatibility in the case of expansion with peripherals, software routines, or system functions, all the data flow is through a single data channel . This is the first sign that System 5000 may not be the end product.

- Software for System 5000 is elaborate, as it would have to be to require so little from the user. Significantly, the software operating system was deliberately designed to withstand future enhancements, although Inforex doesn't hint at what they'll be.

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. . . and why?

Among System 5000's extracurricular capabilities -- which may not be so extracurricular at all -- is included the ability to serve as a data entry device or file overflow reservoir on a big data base management system. With a file search by field capability and its built-in capacity for future enhancement, some unforeseen hybrid applications could still arise. Although the company is deliberately playing down System 5000's data entry possibilities -- it's just not the niche they hope to find -- big users could well come up with various combinations of the System 5000 and their current in-house facility to further extend their information processsing capabilities.

As it is, the company admits that System 5000 probably wouldn't prove cost-effective for a user if he only has one application in mind. But if he can think of two or more things to do at once, then the system begins to make sense.

From the looks of it, Inforex has some pretty customized marketing ahead of it . . . and some heavy educating of the user pool. But key-to-disk was new -- and offbeat -- when Inforex built itself around the concept. With it the company grew to its present $40 million size in just six years. (Alas, there was also KeyScan, an optical character recognition entry the company announced, developed, and ultimately scrapped during the last few years.)

Now, with almost 30% of the key-to-disk market under its purview -- and key-to-disk accounts for about a healthy 7% of all keyboard data entry devices -- the company is recognized as the leader of that particular pack.

Therein may lie the rationale behind System 5000 -- from the Inforex point of view. In the face of the current rage for teleprocessing and the use of distributed terminals for source data entry, key-to-disk appears to be in the waning years of its vogue. Now Inforex, which has basically been a one product company up to now, has come up with System 5000. If enhancements come soon enough and clever enough, it might just do the trick for them with its "acey-deucey" ability to shuttle back and forth along the data flow line -- to the user end with smart terminals and potential for source data capture and to the central processor end with its capacity to handle data base overflow and provide specialized inquiry/response functions.

What will be the impact?

Who knows? For now, System 5000 seems a small threat to anybody currently hawking wares to the EDP community. Perhaps some service bureaus, perhaps some data entry device makers will be affected. Most likely, though, System 5000 will first find a slot somewhere in the "gray area" between the computerized and non-computerized spheres of data storage.

Cronin himself says Inforex is not "betting the company on a new product," and, in fact, it looks almost like they're running it up the flagpole and waiting to see who salutes it -- after which more specific plans can be formulated.

He says this about the company's expectation of acceptance, "We expect a slow start-up for our new System 5000, and our marketing approach will be low-key. But, you know? We think we have a product that's addictive. And what manufacturer doesn't want that?"

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"New" idea for timesharing

FIRST DATA INTRODUCES "CLOCKWORK" . . . STRAIGHT-TIME BILLING FOR CPU HOOKUP

Calling it "Clockwork" and equating it with unbundling, Boston's First Data Corporation next month will actually turn back the clock a few years when it initiates a new timesharing service for its New York users: Billing will be a flat $10 an hour for connect time to First Data's network of five DECSystem 10 computers . . . there will be no charge for actual CPU processing time.

As an adjunct to the company's standard timesharing service, Clockwork will offer smaller program size (up to 120K bytes), eliminate on-line operator support and on-call peripheral service . . . and churn out smaller bills each month.

"The reason we can do this,"explains James Burley, vice president of First Data, "is simply because the cost of actual computation done by the CPU has dropped so much. The processor itself is now only a small part of the system value. For too long our industry has been too vague about what it is that users are paying for -- computer resource units, computer utilization units, or whatever you call them -- who knows what they are? Now, subscribers will know exactly what they're paying for -- for what they'll get."

Bucking a trend

With Clockwork, First Data seems to be bucking a timesharing industry trend toward increasing value added at the user end -- with applications software, proprietary data bases, transaction processing, etc. The company has decided to focus on that 13% of the total computer services marketplace -- the more sophisticated programmers, scientists, and engineers -- that wants plain, raw computer power available interactively in offices and labs. This market added up to $300 million last year and is expected to grow at rates above 20% during each of the next five years.

And First Data, with $3.4 million revenues last year, wants more of this market. Burley expects that well over half of the applications currently being implemented by his customers could profitably be switched to Clockwork. He is confident enough about the reaction from these users, in fact, that the company has expansion plans for another DECSystem 10 in an as yet unannounced "super" configuration.

An industry matures

In likening Clockwork to unbundling, First Data says it wants users to pay for the "naked" product . . . in this case computer availability rather than data mastication. Even so, extras -- such as rental of mass storage -- will still be charged for. Thus, it seems to EDP/IR, the service would appeal only to users with "compute bound" problems requiring relatively small amounts of data.

But it may work. It certainly is an interesting "giant step backwards" -- to use a current advertising cliche.

The mainstream of timesharing is toward end-user applications . . . with the financial management packages, accounting transaction processing, and the like. But there is, and probably will continue to be, a hardcore of users who want merely a chance to "do their own thing" on an unadorned computer -- "People," as Burley

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puts it, "who don't particularly want their hands held . . . and think they should pay less because of that."

Burley believes -- and as recent IDC studies also indicate -- that the timesharing industry is entering the second phase of its short, rocky life. The first phase was characterized by rapid technological development followed by the economic shakeout as this decade began. It weeded out all but the most hardy competitors.

So far, so good. "Now, Burley thinks, "people know how to timeshare a computer -- it's not the deep, dark mystery it once was -- and the industry is entering an era where it must become more professional, more sophisticated in its marketing. We think Clockwork is a step in that direction."

Many of his competitors would disagree. They see in-house systems and minicomputers as potent competition to unadorned interactive timesharing service. Most are moving toward autotransaction or solution services, a focus on data base management systems, or at least the provision of nationwide networks to entrench their services against the next round of business softness. Only time will tell whether Clockwork, a marketing step backward to the very beginning of timesharing, can be successful in gaining First Data a growing share of a hardcore market.

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The wholesale shopper

THE WHOLESALE INDUSTRY TURNS CAUTIOUSLY TOWARD TELEPROCESSING AS SOLID, STOLID EDP GROWTH CONTINUES

Reaching into the EDP marketbasket, the nation's wholesale industry . . . an industry rumbling carefully but steadily into the computer age . . . seems lately to be coming up with some of the more sophisticated data processing "apples." These include terminals, interconnect equipment, data communications, and outside services . . . in other words, the paraphernalia needed to support a growing use of teleprocessing, data base management, and autotransaction.

The trend is understandable. An industry with all the "meat-and-potato" functions of inventory control, order processing, shipping, receiving, warehousing, etc., conjures up a vision of terminals on loading docks, CRTs on the front office counter, and automated stockrooms . . . the workaday use of remote access data processing and unplumbed potential for automatic transaction processing.

And that vision is not all that abstract, according to a recent study by International Data Corporation (IDC), publisher of EDP/IR.

Among the findings:

- While overall EDP investment by the wholesale industry should grow 14% this year, spending for CPU systems themselves will only register a 2% rise. Also, wholesalers seem noticeably shy about buying their own machines. Only one in ten is willing to take the plunge -- about half the normal rate.

- Taking up the slack in the growth rate will be more spending on terminals, interconnect equipment, data communication lines, and outside

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EDP INVESTMENTS,1973
(Source: IDC's 12/73 Computer Installation Data File)

Total Site EDP Investment	Total File: No. Sites	No. CPUs	$M Value	Wholesale: No. Sites	No. CPUs	$M Value
< $500,000	17,677	20,732	$2,873	1,178	1,262	$177
$5-700,000	3,533	4,251	2,027	131	154	75
$7-900,000	803	1,548	618	18	26	14
$9-1,000,000	860	1,097	812	24	28	23
$1-10,000,000	4,524	12,299	1,737	107	211	208
> $10,000,000	222	2,758	3,677	3	17	38
Total	27,619	42,685	11,744	1,461	1,698	535

services. This will up the ratio of this type of spending to spending on CPUs from one third last year to one half this year.

- Most of the total EDP growth will be the result of spending by medium size users, while large users consolidate and regroup existing facilities and small users -- who will post the largest growth rate for CPU systems spending -- simply "hold the fort" with a minimal increase in overall EDP outlay.

Small machines predominate

IDC's study shows that the nation's wholesalers have traditionally opted for small or medium-size machines -- along the lines of IBM's System/3 -- to fill their EDP needs. For instance, four-fifths of the wholesale firms listed in IDC's vast computer installation file sport computers valued at less than $500,000, and only three have machines that go for $10 million or more. The wholesale installations account for only half the percentage by value that they do by number . . . and support less than the average number of CPUs per site.

Add to the industry profile the fact that wholesalers use fewer terminals -- both in total and per system -- than their counterparts and the "catch-up" aspect of their EDP growth becomes apparent. If they are somewhat conservative in their EDP utilization, at least when they do make the jump to increased automation they'll be able to leapfrog to the latest technology . . . providing the price tag appeals to their cost-conscious, chary eye.

Harnessing the CPU

How does this well-entrenched industry (sales this year expected to top $386 billion and inventories to reach $33 billion despite a flagging GNP and ballooning inflation) plan to wield its half billion dollars worth of computing machinery? In the past, according to the sources tapped by IDC's survey, over half of their computer applications have been in the area of general accounting and inventory control (30% and 22% respectively). Order processing came in third with 17%.

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For their own future, though, respondents foresaw a dramatic increase in the use of computers for inventory control . . . including on-line inventory control . . . with over a third of them planning new applications in this area. The accounting functions looked to remain stable at 30% of the new applications, thus slipping to the number two priority.

Not only that, but while new applications for order processing declined a little (to 13%), wholesalers consistently mentioned the use of more on-line equipment in this category. They are realizing that a move toward the more sophisticated, real-time systems . . . and networking . . . can be a move toward better profit ratios, especially in the face of inflationary pressures.

Unplugging the bottleneck

When it comes to data processing bottlenecks, wholesalers sing an old familiar tune: data gathering and input foul-ups as the number one trouble maker, system equipment snafus as number two. Like many of their contemporaries, wholesalers found key punching problems to be of major concern. More often than not, the solution they envisioned for the data entry problem entailed switching to a key-to-disk system. Also, over half of their solutions to data entry hassles mentioned the possible use of POS devices or on-line terminals. And from their spending patterns it seems that the wholesalers might be following their own advice.

As for problems encountered with hardware, the solution most often proffered was simply to chuck the old equipment and replace it with new. The IBM System/3 seems to have a special appeal to wholesalers -- indeed, they comprise 15% of the System/3 user base -- and many of the respondents indicated eventual plans to hook two or more together into embryonic networks.

The view from here

From the IDC study a picture emerges of the wholesale industry as one that is cautious with its EDP dollar, yet willing to use it . . . if it can be used wisely and for long-term benefit. This is understandable. The nation's distributors of durable and non-durable goods live, more than most, in the shadow of the GNP, and when it lags they concentrate all the harder on keeping costs and prices in line.

Yet for all the murkiness of the economic future -- aggravated by inflation and the uncertainty caused by the lifting of wage-price controls -- the wholesale industry is in excellent health. Market observers predict an 8% growth in sales for 1974 . . . and into the late 70s as the economy stabilizes. And, according to the National Association of Wholesale-Distributors, as late as 1972 only 40% of the industry utilized computers in any way.

So as an EDP market, the industry is big, sturdy, and ripe:

- First, for automation in general. Wholesalers realize the need to update outmoded systems for long-term savings. At the same time, equipment costs are dropping into ranges they consider feasible.

- Second, wholesalers are seeing new avenues of computer utilization open up to them . . . and are taking advantage of them. Advanced technology is carving new markets for itself, focusing on specialized sectors of the computing community. The wholesale industry -- as one of these sectors -- seems to be looking forward to the courtship.

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• DROPPING CHARGES AGAINST SPERRY UNIVAC INFORMATION STORAGE SYSTEMS -- which as Information Storage Systems before acquisition by Sperry had supplied Telex with disk drives and been named in an IBM countersuit in that case -- IBM signed a five year cross-licensing patent agreement with ISS's foster parent Sperry Rand. The pact supersedes a previous one penned in 1965 and covers data processing gear developed and patented by the two firms. The only money to change hands will come out of Sperry pockets ($250,000) and apparently go for the IBM patent rights on 3330 type disk drives made by ISS. Agreements like the one between IBM and Sperry are one way for competitors to minimize the number of nettlesome patent disputes that don't really affect vital business interests, and IBM has similar arrangements with CDC, DEC, Burroughs, and others.

• AND ON ANOTHER FRONT, SPERRY RAND announced last week that its Remington division has been consolidated into its Univac division. The unification of the small business machine maker with the computer outfit could mean a prepping action for a drive onto the small business computers market -- relatively new territory that Univac has been eyeing for some time.

• WHAT'S FASTER THAN A SPEEDING IBM 370/155? A 370/155 with an Accelerated Storage Adapter (ASA), according to Fabri-Tek. The Minneapolis peripherals manufacturer claims its ASA -- priced at $76,000 -- allows a CPU to take advantage of the Fabri-Tek/Data Recall memory's 50% faster access time and 40% faster read/write cycle time. In a two-month customer test with 2048K of its memory, Fabri-Tek reports that average transaction time decreased by 20% and CPU active time decreased 23.9% on benchmarks running IMS remote terminal jobs. The monitor allows IBM memory to be run on a system, but doesn't improve performance in those cases.

Fabri-Tek isn't the first Independent to go after the big, non-VS 370 market. Over 1400 155s are installed worldwide, and enhancements are offered by CDC, Itel, and Cambridge Memories. There's money among the "forgotten" 370 users.

• MORE ON CORE. It seems the do-it-yourself rage has finally come to Memory Town. Cambridge Memories has introduced an expansion memory for the IBM 360/25 which consists of simple-to-use modules that allow non-technical computer operators to install, expand, test, maintain, and repair their own CPU memory. The company claims the add-on memory can save up to 70% of the cost of IBM equivalent, with 10% of that coming from reduced field engineering and maintenance labor cost. Dubbed 360/CORE 25, the system has been in shipment to overseas customers since the spring and was designed by a CM subsidiary in Germany.

• GIVING THE CHECKERED FLAG TO 4K RAM, Intel announced that a new 4K random access memory (RAM) chip is now available from their distributors and is priced at only $12 in 100-up quantities, even less in OEM amounts. The p-2107A-8, as it is called, has an access time of 420 nanoseconds(ns),read cycle time of 690 ns and a write cycle time of 970 ns. Intel expects even faster versions of the chip to be ready for market this fall. Intel, the pioneer of the microprocessor revolution, has actually been producing 4K RAMs for a while, but apparently waited until now to blitz the market to protect its lucrative business with its 1K chip.

• WINCHESTER WILL BE AVAILABLE TO ALL 370 USERS by first quarter, 1975 via a single-drive 3340 unit for 370/115s and 125s. For $20 a month (ETP) extra, the units can have the fixed head feature -- whereby 30 fixed heads make one-half million bytes available with no time delay; movable heads access up to 69.3 million bytes.

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